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TO CORRESPONDENTS.

G.B. *and several other correspondents have sent us copies of a second letter which* "Experimentum Crucis" *has addressed to them after two months' silence, spent, we presume, in*

"Nursing his wrath to keep it warm."

This second resort to the "type and paper of Lancashire" is even more contemptible than its predecessor, and we are induced to notice it simply to enable us to repeat, what we have already several times previously stated, that we do not hold ourselves responsible for any of the opinions put forth in our columns, except those of the Circular to Gas Companies, though we take all reasonable precautions for ensuring the accuracy and bonâ fide character of all communications to which we give publicity, the exercise of which discretion has so raised the writer's ire. We defy him to point out a single line for which we are responsible, where we have confirmed any of the opinions and theories advanced by "Aluminium Ferrum," *with some of which we disagree, notwithstanding the able manner in which they are treated. Their author is now, thanks to this correspondence, well known, and we repudiate the impudent insinuation that any one else participated to our knowledge in their composition. The most serious charge, however, still remains to be disposed of.* "Experimentum Crucis" *accuses us of having "endeavoured to palm off a forgery" upon our readers. Any of them may, however, set the matter at rest by a direct inquiry of Dr. Fyfe, whether the passage at page* 111 *of volume I. of the Journal, in which the doctor, in speaking of Newcastle coal gas, is made to say,* "The value of the English Parrot coal gas will be nearly the same as it is," *is not a correct transcript of his communication, and whether the English Parrot coal gas there mentioned is not the Lancashire cannel gas as used in Manchester and Liverpool at the time when his experiments were made? The doctor's address is "King's College University, Aberdeen," and we trust he will consider the heavy charge brought against us as a sufficient excuse for any trouble this vindication of our veracity may cause him; notwithstanding that our experience of the relative value of the two gases in question differs from his own. The other parts of the production are beneath our notice; but we should advise the writer to take a few lessons on the use of inverted commas before again venturing into print with another batch of "Elegant Extracts" from his own store of knowledge. Nine-tenths of his apparent quotations are mere draughts upon his own imagination. We shall cordially welcome the appearance of the promised "Impartial Journal of Gas Engineering."* Brothers, *labouring in so large a vineyard cannot be in each other's way.*

T. W. B.'s *letter and enclosure of the 17th ult. are duly received, and the explanations shall be embodied in the continuation of the article to which he refers.*

NOTICE TO AMERICAN READERS.

Complete series of the Journal may be had of Messrs. D. Appleton and Co., 200, Broadway, New York, to whom all subscriptions for the United States, after the 10th of January, 1851, must be paid.

NOTICES.

The subscription is 10s. per annum if paid in advance, or 12s. on credit, payable in two sums of 6s. each, due in June and December of each year. All subscriptions commence from the 10th of January.

A few copies of Vol. I. may still be had, price 16s. bound in cloth, or 17s. with the last return made to Parliament by incorporated gas companies. Lettered cloth backs for binding are supplied by the publisher at 2s. 6d. each.

All communications and orders for Advertisements to be addressed to the Editor, 32, Bucklersbury, London.

Back numbers exceeding three months' date will in future be charged double price, unless six or more consecutive numbers are taken at the same time. Nos. 6 and 18 are out of print.

The Editor will be particularly obliged by his friends forwarding to him Notices of all Meetings, Trials, or Appeals which it may be interesting to the Gas World to have reported.

AVIS

A MM. les Exposants étrangers de l'Exposition de l'année 1851.

Le Rédacteur du Journal d'Eclairage au Gaz a l'honneur d'annoncer aux inventeurs et propriétaires d'appareils pour la fabrication, distribution, et les emplois à l'usage du gaz, qu'il est pret a se charger de leurs intérêts, pour la grand exposition internationale de l'année prochaine. S'addresser franco au Rédacteur du Journal, 32, Bucklersbury, à Londres.

Circular to Gas Companies.

The Editor may be consulted on all subjects connected with the supply and manufacture of gas, or the alteration and improvement of gas apparatus, and the construction of new works.

It will be in the recollection of most of our readers that the several bills proposed by the Great Central Gas Consumers' Company, and rejected in the last two sessions of Parliament, have contained a quality clause; viz., one requiring that the gas to be supplied by them shall be of such illuminating power that a 15-hole argand burner consuming five cubic feet of gas per hour shall give a light equal to twelve wax candles of six to the pound, consuming 120 grains of wax per hour. The same clause is, we believe, introduced into the new bill, which was read for the first time on the 6th instant; and we are informed that a movement is in contemplation by an influential body of gas consumers, the object being to petition the Legislature for an alteration in this clause, by the substitution of three cubic feet instead of five cubic feet, the equivalent in candles remaining as proposed at twelve. Such a petition, duly and energetically prosecuted, will bring before the Legislature the question of the possibility of economically manufacturing gas in London of high illuminating power from cannel coal, and an interesting inquiry is anticipated. There can be no doubt but that since this gas was tried in the metropolis, and failed, great revolutions have taken place; and that new channels of communication have been opened out, as well as fresh sources for the supply of the material discovered. The question for examination is whether, under these circumstances, a permanent supply of materials can be obtained at such a cost as will allow of gas of the high illuminating power supplied in Scotland and in Lancashire to be introduced into the metropolis; for, even supposing it were deemed requisite to augment the price to meet any increased cost of production, there can be no doubt but that it would be preferable to pay 5s. per 1000 feet for gas of which three cubic feet per hour could give a certain quantum of light, than 4s. for such other gas as will require the combustion of five cubic feet to produce the same effect. While combatting the insane attempts made to lower prices to an unreasonable extent, we have invariably maintained that the true policy would have been to increase the illuminating power; and it is a source of some gratification to us to find this principle is commencing to be appreciated by gas companies, as well as gas consumers.

In the course of some experiments, which, through the kindness of an esteemed friend, we have lately had the opportunity of making in the most complete experimental gas apparatus in the kingdom with which we are acquainted, and to which we shall have occasion to refer at a future period, some curious facts

developed themselves as to the description of burner best adapted for the combustion of the different qualities of gas, which it may be interesting to many of our readers to note, more especially to those who are contemplating the use of gas of higher illuminating power than they are accustomed to. These facts go to prove that, while an argand is the best description of burner for weak gas, and batswings or union jets the worst, the *reverse is the case when good cannel coal gas is used*, the latter giving far better results than argands. The following instances are taken from our note-book, the standard light being a batswing burner, consuming 2·82 cubic feet per hour of Wigan cannel gas, and giving a light equal to 12·64 sperm candles of 120 grains per hour. Lights equal to the standard light were produced from the combustion of the following quantities of gas from Pelton (Newcastle) coal, according to the burner used:—

7·26	feet per hour,	in a batswing rather too small for the quantity consumed.
6·12	ditto	larger ditto.
4·86	ditto	a common London 16-hole argand, with 7-inch chimney glass.

No experiment could be tried with a union jet burner, as none could be found at hand which would pass the quantity of gas requisite to give a light equal to the standard burner.

When, however, the same experiment is repeated upon gas of *higher* illuminating power than that from Wigan cannel, the results are reversed, as the standard light required the combustion of the following quantities of this richer gas, to equal the light from 3·42 feet of Wigan gas:—

3·06	feet per hour	in a two-ring London union jet.
3·06	,,	small batswing.
3·78	,,	the sixteen-hole argand above mentioned.
3·9	,,	Winfield's argand with conical chimney.

The above will show how necessary it is carefully to study the description of burner best suited to the combustion of the different gases, and how easily an experimenter, without adequate experience of the best mode of operating, may be unintentionally misled into an incorrect appreciation of their qualities. One of the above experiments makes Wigan cannel gas 157 per cent. superior to the Newcastle gas operated on, and the other only 72 per cent., the two trials being made on the same gas, within a few minutes of each other, and under precisely similar circumstances, except as to the burners. This may serve to explain the extraordinary differences reported by Mr. Wright, in his published experiments on the comparative illuminating power of the Western and Chartered gases, in which the variations extended from 80 to 132 per cent., but in none of them were burners used best suited to the competing gases. The sixth experiment is the nearest approach to it, and, had the Western gas been burnt in a suitable batswing or union jet instead of in an argand, a fairer comparison would have been made. As it is, the whole series are, in our estimation, very unsatisfactory, and no dependence can be placed on them, as indicating the real illuminating power of each gas, when properly and economically consumed.

The *World's Exhibition* of the coming season is to be deprived of the interesting addition which a supply of gas to the various gas apparatus exhibited would have afforded, and by which their actual operation would have been best explained. Why steam power should have been provided for giving motion to the machinery, and gas refused for the exhibition of the many uses to which it may be applied, appears unreasonable; but we presume the commissioners have what they conceive to be sufficient reasons for the decision come to. Some spirited individuals have, however, taken the matter up, and determined that the opportunity shall not be lost of making the millions who are expected to visit the metropolis better acquainted with gas, and thus become the means of extending its employment on their return to their own localities. The idea is an excellent one, and will be spiritedly carried out by the committee which has been formed, whose address appears in another page; and we fully rely upon the cordial co-operation of the gas companies of the United Kingdom in contributing to its success, not only by their influence, but by their subscriptions to the necessary expenses.

Mr. Rutter's valuable observations on Street-Lights, inserted in our last, have been reprinted, and published by Mr. J. W. Parker, West Strand. A letter from a correspondent at Middlesbro'-on-Tees, inserted elsewhere, gives satisfactory proof of the soundness of the principle so ably advocated by Mr. Rutter.

Communicated Articles.

THE HYDRO-ELECTRIC LIGHT.

Some account of this invention was given in the Journal for August last. The patent for this country was taken out by Mr A. V. Newton, as a communication from a foreigner residing abroad, and the specification was duly enrolled on the 12th of December, 1850. We should have given it at the time, had we been able to obtain a copy, otherwise than by payment of the extortionate charge of £15 or £16, demanded by the officials under our iniquitous patent laws; but, as we saw nothing in the invention to warrant such an expense, and as all interest in it had died away, we passed it over without further notice. The American papers have, however, lately revived the subject in articles, a selection from which will be found below; and, as we are promised an exhibition of its powers in this country, we shall possibly have an opportunity of testing it at an early period. The inventor maintains that, by his peculiar combination of the magneto-electrical machine, he can produce hydrogen from water in large quantities, and at a moderate cost, without evolving oxygen. This we will only credit when we see performed. The rendering of hydrogen luminous in combustion by passing it through spirits of turpentine is no novelty, and has long since been practised in many of the apparatus for producing artificial light. Upon the whole, we see nothing to alter our previously-expressed opinion of its being at best a scientific toy, and destitute of all the elements of practical utility.

(*From a Boston, U.S., Paper.*)

Having been favoured, in company with Mr. Huse, of this city, Mr. Ames, of Springfield, and Mr. Merrick, president of the gas company of that city, with a view of Mr. Paine's apparatus for producing light from water, and of witnessing the whole machinery in operation, as well as operating it myself, I yield to the advice of friends in giving publicity to my observations. Although I have been more or less conversant with chemistry and chemical experiments for the past eight years, yet let it not be supposed that I consider myself deeply learned in these matters, because I venture to write upon a subject so full of mysteries and apparent contradictions as Mr. Paine's light. This article is not intended exclusively for the scientific, but for the general, reader; and I shall endeavour to give such explanations of the apparatus used by Mr. Paine that all can understand it.

Mr. Paine claims, among other things, to have discovered a means of increasing the power of a magneto-electric machine to such an extent that he can decompose water rapidly with it; that he can take a jar of water, and, by means of the electricity induced by this machine, can convert the whole of it into hydrogen gas, without the production of any oxygen whatever. He claims, also, that by changing the electrical poles he can convert the whole of the jar of water into oxygen gas, without producing any hydrogen; that, after producing the hydrogen as above, and passing it through spirits of turpentine, it becomes catalized, and then will burn with a clear and brilliant flame; and this, too, without any loss to the turpentine by the passage of the gas through it. In regard to light, independent of the other applications of the power, Mr. Paine claims to have discovered a means of producing it from water, by electricity, at a cost infinitely less than any mode now in operation.

The above are startling propositions. Can Mr. Paine demonstrate them by practical experiments? The object of this article is to describe the apparatus used, and the result of the experiments, as they appeared to me. I shall not advance or defend any theory.

Before giving the result of the experiments, let me describe the apparatus. This consists of four pieces, all placed upon a pine table or shelf, and in no way connected with anything else.

First. A common magneto-electric machine, consisting of two permanent horseshoe magnets about twelve inches long. These were placed horizontally on a mahogany frame, about four inches apart, one being placed above the other. Between the ends of these magnets were a pair of helices, and these so attached to a wheel above that they could be set into a rapid rotary motion. The peculiar construction of these helices, from which the immensely increased power is said to be obtained, I will hereafter describe.

Second. A large open-mouth glass jar, capable of holding twelve quarts. This was a little more than half filled with water. (We tasted the water to satisfy ourselves that it was water.) Within this jar was placed a common bell-glass, open at the bottom, and reaching within four inches of the bottom of the large jar. The top of the bell-glass was closed tightly with a brass cap, which extended over it, so as to rest upon the sides of the outer jar. Passing through the cap of the bell-glass were two wires, which extended down nearly to the bottom of the bell-glass, and these terminated in a circular metallic box, one and a half inches long, and one inch in diameter. This box was hollow, and perforated with small holes in the upper part. The electrodes, or points of connection between the poles, were in this box. The water in the jar and bell-glass reached some six inches above the electrodes.

Third. A quart glass jar, half filled with spirits of turpentine. A tube or gaspipe passed from the top of the bell-glass (above mentioned) and into this jar of turpentine, terminating at the bottom of the turpentine. From the cap which covered the jar of turpentine another tube or gaspipe passed to a jet or burner, about twelve inches from the jar.

Fourth. A common glass tumbler half filled with water.

The above comprised all the apparatus used by Mr. Paine, with the exception of three wires, or rather flat strips of copper, by which he connected the magneto-electric machine with the jar of water. The wires were connected in the following peculiar manner:—The end of one wire was screwed to the negative pole of the magnetic machine; and the other end to the first of the wires coming up from the electrodes through the top of the bell-glass. A second wire was screwed to the positive pole of the magnetic machine, with the other end terminating in the glass of water above mentioned. The third wire was screwed to the bell-glass, or rather the second wire, which passes through it from the electrodes within, and terminating in the some glass of water, although the wires in the glass did not touch each other. I have spoken of these as wires: they were not wires, but merely thin strips of copper, having the appearance of being rolled out from wire.

Now for the operation of the machinery. Mr. Paine commenced turning the wheel in the magneto-electric machine, and we all looked to see

the gas arise from the electrodes in the jar of water; but no gas appeared. Mr. Paine was surprised; we were all surprised. At length Mr. Ames discovered that one of the wires, or copper ribands, had been detached, or had not been screwed on to the wire at the top of the bell-glass. This being corrected, Mr. Paine again commenced, turning the machine, and instantly large bubbles of gas arose from the electrodes, and filled the jar in less than a minute. After taking out a stopper from the bell-glass, and allowing several jars full of gas to escape, in order to expel the common air and prevent an explosion, these were stopped, and the gas forced on through the gaspipe into the turpentine, and through this to the jet or burner. Between the jar of water where the gas was generated and the jar of turpentine a jet issued from the pipe. This was lighted and proved to be hydrogen gas. The flame in front of a window was so pale that it could not be perceived. We could see it by placing a dark body behind it. While this was burning the gas was forced along through the turpentine to the other burner. A flame was applied to this, and a brilliant light shown!

Here were two flames burning at the same time, from the same gas; the first, before passing through the turpentine, burning with a pale, almost imperceptible, light; the second, after passing through the turpentine, burning with a light superior to any gas that I ever saw before. When the magnetic machine was stopped, not a bubble of gas would appear in the jar, and the lights went out. This small machine generated gas enough to supply a dozen burners, any one of which, I should think, sufficient to light a room.

Now, it will naturally be asked, "Could not this tremendous electrical power which decomposed the water be obtained from some other source than the magnetic machine?" This question occurred to me before I saw the operation; and I determined, if possible, to satisfy myself upon the subject. I, therefore, with Mr. Paine's full permission, examined the table. I could easily see that no wires or pipes entered the glass jar of turpentine or the glass jar of water, except the two connected with the magnetic machine. It was, therefore, to the magnetic machine that my attention was mainly directed. This machine I took up, and lifted it entirely away from the table; saw that no wires, pipes, or metallic substances whatever had any connection with it from the table. I placed the machine again on the table and turned the crank, and produced the gas in the jar, in the same manner and with the same success that Mr. Paine done. Mr. Ames and Mr. Merrick did the same, and we were all satisfied, perfectly satisfied, that the water was decomposed by the electricity from the magnetic machine, and nowhere else. To deny this we must deny the evidence of our own senses. The gas was also produced faster by a thousand, yes, ten thousand, times than we had ever seen it before by a similar apparatus! We had also the most positive evidence that the gas, after passing through turpentine, furnished a brilliant light. The gas produced appeared to be hydrogen—we judged by the smell and the burning—and yet, Mr. Paine said, although he called it hydrogen gas, it differed from the ordinary hydrogen. I asked Mr. Paine why he interrupted the positive pole by the glass of water—why he cut this wire in two and placed the ends in the glass of water? He said that, unless this was done, both hydrogen and oxygen would be generated in the bell-glass; but that by this means he only obtained the hydrogen. There appeared to be no oxygen generated by the operation.

As to the amount of turpentine consumed by passing the gas through it, it was impossible for us to determine in the short time—an hour—we were engaged in generating and burning the gas. Mr. Paine stated that the gas was not carbonized, but was catalized in passing through the turpentine, and there was no loss to the turpentine by the process. Several gentlemen of high standing in Worcester, a few days previous to our visit, purchased at a store a small quantity of turpentine, measuring it accurately, which they took to Mr. Paine's establishment, and passed the gas, produced by three sets of magnets, through it for several hours, lighting the whole of Mr. Paine's house. The turpentine was again measured at the close and found to have lost but a teaspoonful; only as much as would be lost by evaporation and by turning it from one vessel into another. A certificate was published to that effect.

The helices. Mr. Paine claims that, by an improved construction of the helices in the magneto-electric machine, he has increased the electrical power of that instrument infinitely, say ten thousandfold, sufficient to produce the wonderful results above described. The peculiar construction of these helices were shown to us, and explained. Before describing them I should make a remark respecting the ordinary helices of a magneto-electric machine. It is well known that the power of an electro-magnetic machine, with the ordinary helices, up to a certain point, depends upon the amount of surface of insulated copper wire in the helices. It is only upon the surface of this wire that the electricity can be conducted. Mr. Paine's helices differ from the above in this, that the wire which forms the coil is made hollow, being formed by twisting or winding very thin strips of copper, forming it into a tube. This wire or tube is then covered with indiarubber or gutta percha to insulate it, and then filled with water. This water within the wire, forming the helices, is so arranged as to be brought in contact with the current of electricity, induced from the magnets, in the same manner as the wire that surrounds it. Faraday has established the fact, that a very small quantity of water is capable of containing a vast amount of electricity (I think he says that a single drop of water will contain as much electricity as a thunder cloud), sufficient to burst off the gable end of a house. Just in proportion as the power of the helices is increased to induce or receive the electric current, so is its power increased to give it off.

Now, look at Mr. Paine's arrangement. In the first place, he has a double surface of wire exposed in the helices—an outer and an inner surface. In the next place, he has half a pint of water revolving in his helices—a substance capable of containing a thousand, yes, ten thousandfold, more electricity than the same bulk of copper wire. The above description of Mr. Paine's helices I have given with his full consent and approbation.

To this improvement in the construction of the helices, Mr. Paine claims to have increased the power of the magneto-electric machine, so as to produce the wonderful effects above described. The experiments which we saw, and in which I think we could not be mistaken, would go to show the claim of Mr. Paine to be well founded.

I have here given a plain statement of facts, as they were shown and explained to us, and leave every one to draw his own conclusions. Whether Mr. Paine can apply his improvement practically on a large scale, sufficient to light a city—whether he has discovered "perpetual motion"—whether he has discovered a substitute for all other motive power, and for all other heat, as well as many other things which are claimed for him—are questions involving more difficulties than I feel, at present, competent to solve. I am far from denying, however, that he can do all these things.

C. Q. Colton.

(*From the Boston Chronotype.*)

"The means by which Mr. Paine exerts an agency upon the water through the copper ribbons is a sort of electro-magnetic condenser—an instrument different from those manufactured by the electro-magnetic instrument-makers in this city, only in the interior construction of its revolving helices. It consists of two sets of larger permanent, horseshoe magnets, parallel and opening in the same direction, between the poles of which a pair of helices are made to revolve horizontally. There is no galvanic action in the case, and no expense whatever on these helices but of the slight mechanical force which is necessary to give them a moderately rapid revolution, they meeting no resistance but that of a common pivot and the slight friction of their poles upon metallic discs to effect the successive discharges. But the power of this simple arrangement to evolve electricity is tremendous. The electrical force compared with the mechanical cause is like that of the rush of water which carries the wheel of a great cotton factory compared with the effort of a child who may hoist the gate. At each discharge of the helices, and there are many in a second, according to the rapidity, an abundant crop of gas bubbles is produced; and this owing partly to the peculiar construction of the electrode, or form of the poles where presented in proximity to each other in the water of the jar. This electrode is a point of great interest, and it is just at this point that the mighty and mysterious fluid, so potently commanded and propelled by helices, may prove too big for its business, and show its relationship to the favourite weapon of Jove. Here is a stupendous difficulty which has tasked the courage and inventive genius of Mr. Paine—a difficulty of which the public could not be aware, and which seems to account for much delay. He has tamed the thunderbolt in this delicate point, at least so far as to ensure perfect safety with due care. Other safeguards may yet be added. However, it is but right to say, that it would not be strange if carelessness and temerity should hereafter meet with a fate here—that will be a caution to them.

"The next question is, whether there is any expense of the spirits of turpentine. We certainly could not discover, while we watched it, the slightest waste or diminution. Mr. Paine and others testify that there is no expenditure of that material. The nature of the luminous flame convinced us that it had gained nothing in quantity, only something in quality, from the spirits of turpentine; and this hypothesis, as any booked-up chemist will admit, is nothing unprecedented. In 'Stockhardt's Chemistry,' an excellent work, we find the following passage, page 473:—

"'Starch, as shown by these experiments, is converted by sulphuric acid, on moderate heating, into gum; on stronger heating, into sugar. In the latter case, also, dextrine is first formed, but this soon passes over into sugar. Accordingly, sulphuric acid exerts two different actions. By the first action the starch becomes gum (dextrine); by the second action the dextrine becomes sugar.

"'It has not yet been explained how this effect was produced. Starch, starch-gum, and starch-sugar have each the same constitution (isomeric), so that their difference undoubtedly depends upon a different arrangement of the atoms of carbon, hydrogen, and oxygen contained in them, and it is undoubtedly the sulphuric acid which effects this change in the position of the atoms.'

"Then, again, after a man has, with his own eyes, seen water converted into hydrogen, and nothing else—unless the oxygen goes off through the solid copper ribbon of the positive pole into a cup of water, and is there drowned without a sign or a bubble—we say, after a man has seen this transformation of water, so unauthorised by the books, it will not be very incredible to him that the spirits of turpentine may change the *quality*—the electrical state—arrangement of particles, or whatever you may suppose it—in the hydrogen, without imparting anything whatever to it. This, we must say, is what we are strongly inclined to believe that it does. On the whole, we feel confident that Mr. Paine has discovered the means of producing an inexpensive light of the purest and most efficient quality, and opened a new and vast field in science. We have seen for ourselves, and find that we have done Mr. Paine very great, though not intentional, injustice. And we can hardly find words to express our surprise at the scientific report which was partly the cause of our doing so. The demonstration which Mr. Paine then presented could not have been of a doubtful character to *chemical* eyes. Those gentlemen must have understood and believed more than they reported."

(*From the Scientific American.*)

"The conclusion of the whole matter as reported by Mr. Wright (the editor of the *Chronotype*) is, first, that Mr. Paine has made a discovery which proves that neither oxygen nor hydrogen are simple substances, and that water is not, as has been supposed, a binary compound of these two gases. Second, that Mr. Paine decomposed, by negative electricity, the whole of the water in a vessel, and the gas evolved was *pure hydrogen*. Third, that this gas was produced rapidly and cheaply by mechanical power generating electricity. Fourth, that the hydrogen gas was made to produce good white light by passing it through the spirits of turpentine, which catalyzed the gas without absorbing or consuming the turpentine.

"By this we learn, then, that there are no such things as hydrogen and oxygen—that is, as simple distinct substances. We must have more of the why and the wherefore before we can believe this. The quotation from Stockhardt does not satisfy us altogether; there is a difference between the compounds *starch*, *dextrine* (British gum), and *sugar*, in quantity if not in quality. Starch is composed of C 12, H 20, O 20; grape sugar (the kind made from starch) is composed of C 12, H 14, O 14 (carbon, hydrogen, oxygen). It is true, however, that each has the same constitution, and the comparison is clever, but he might have carried it further and stated that the atmosphere and nitric acid had the same constitution. Has the hydrogen, after passing through the turpentine, been analyzed? This is the way to test whether carbon is absorbed by the hydrogen when passing through the turpentine. There is still, no doubt, a vast ocean for exploration before the chemist; but we like chemists who have the spirit of Davy, who never wrapt himself up in mystery, but let the world always know how he was progressing. In respect to the turpentine not being absorbed by the hydrogen, there is collateral testimony in favour of Mr. Paine, and there is also testimony against him. If water can be all resolved into hydrogen, surely hydrogen can be resolved into water. Now, it is well known that it requires hydrogen and oxygen, and a third substance, to produce water. Hydrogen and oxygen will remain as distinct gases, in one jar, for any length of time, without forming water, and not until a piece of platinum, or the electric spark, performs the marriage ceremony, will unite chemically to form water. This wants to be cleared up in the case of Mr. Paine's discovery. These things should be treated fairly, and good reasons given. Hitherto water never has been decomposed by a single pole of a battery, and those who believe it cannot be done are

entitled to the greatest confidence, until it is publicly demonstrated to the contrary."

Letter from Mr. G. Mathiot, of the United States Mint, to the "Scientific American."

"Messrs. Editors,—I have passed hydrogen through turpentine and found it to acquire high illuminating properties. You know there is an old experiment of the 'philosophical candle,' made by generating hydrogen under a stratum of turpentine; but, thinking the newly generated or nascent hydrogen might have the power of decomposing or absorbing the turpentine, I led the hydrogen from the generating bottle by a bent tube dipping under the turpentine in a separate bottle. The light was very brilliant; in intensity, I thought between the Drummond light and the solar lamp; a spirit gaslight looked dingy alongside of it—as ordinary lights appear by the lime light. The taking of a daguerreotype by it would have been very easy.

"I next directed my attention to ascertain the quantity of turpentine used along with a known quantity of hydrogen. I first accurately measured a portion of turpentine, and then passed the gas from 33 ounces of zinc through it, burning the gas at the jet all the time. I then again measured the turpentine, and found it not perceptibly less than before. Now, in this case the hydrogen could not have been changed into carburetted hydrogen, for coal gas contains from four to five times as much carbon as hydrogen, and pure carburetted hydrogen has six times as much carbon as hydrogen; and as 33 ounces of zinc, by solution, liberate one ounce, or 12 cubic feet, of hydrogen, therefore from four to six ounces of turpentine should have been used up, supposing it to be all carbon; but turpentine is composed of twenty atoms of carbon to fifteen atoms of hydrogen, and consequently only one-seventh of its carbon can be taken up by the hydrogen; or, in other words, 42 ounces of turpentine will be required to carburet one ounce of hydrogen. Yet, still thinking that some portion of the turpentine might be evaporated, I cooled the bottle with the turpentine, and placed the whole apparatus in a cold bath, and tried the experiment over again, but the light was the same. I then heated the turpentine to 120°, and then passed the hydrogen through it, but the light was the same. I then took a half gallon tincture-bottle, and put in nearly three pints of cold water and three quarters of a pint of turpentine, and let the pipe from the hydrogen generator run quite to the bottom of the water—the light appearing the same, or a little better. I have used the same lot of turpentine in all these experiments, having had a brilliant light for about three hours; and the turpentine, though frequently poured from one bottle to another, is not a teaspoonful less than before I began the first experiment.

"I have now announced to you the simple facts of the matter, the *rationale* I leave to the scientific world. The next step, after ascertaining that hydrogen can be used for illumination, is, whether the light is according to its weight or its bulk, as compared with coal gas—that is, whether 200 cubic feet of this catalyzed hydrogen will go as far for light as 200 feet of coal gas, or whether it will require 200 feet—one pound of the hydrogen—to do the work of 26 feet—one pound of coal gas.—Very truly yours, &c.,

"GEORGE MATHIOT."

The discussion has given rise to the promulgation of some curious theories in the American press, many of which are so novel in their character that we shall most likely be induced to return to the subject in an early number.

GAS WORKS AT THE WAKEFIELD HOUSE OF CORRECTION.

The monopoly of incendiary gas intelligence so long enjoyed by the *Builder* appears in some danger of being at last encroached upon by a rival in the same line. Many of our readers will, no doubt, have remarked in the daily papers of the past month the advertisements of a periodical called the *Artizan*, headed as above, and conspicuously setting forth that gas was manufactured at the establishment in question at a cost of 9 d. per 1000 feet. Curiosity prompted the investment of a shilling in a document promising to show how such a result could be obtained, and a very cursory inspection of it will convince the reader that had the *Builder* ever gone into details, as its junior has done, instead of confining itself to the repetition of the thousand oft-repeated assertions of all the local agitators of the gas question throughout the length and breadth of the United Kingdom, an opportunity might have been afforded, in many cases, of showing the absurdity of its conclusions, by demonstrating the fallacies of its premises. Our contemporary thus describes the works, and attempts by the following accounts to support his assertion, that the cost of gas is only 9¼d. per 1000 feet:—

"The number of lights in the prison is 1600, to supply which 9 retorts of fireclay are used. These retorts are 15 inches broard, 13 inches deep, and 7 feet 6 inches long, made by Messrs. Railton, of Blackburn. They perform their work very well, and require less care in their use than cast-iron ones would do—a point of material importance, when the unskilled character of the labour is considered. Some of them have been in use twelve months. In addition to these there are two other retorts; one of firebrick double the preceding size; and one cast iron, not in use. It is intended to replace the iron retort by a clay one, and to increase their number. They are charged about every four hours. The coal used is Silkstone Slack, costing about 5s. 3d. per ton, delivered. The firing coal is from the neighbourhood, worth about 8s. 9d. per ton, delivered. There is only one gasholder at present, 40 feet diameter, and capable of containing 20,000 cubic feet. This holding room is insufficient for the present consumption, the gas being used before it is properly cooled; it is therefore intended to erect an additional gasholder.

"There are four dry lime-purifiers, 2 feet 5 inches deep, in two compartments, 3 feet 2 inches square each. Each compartment has four riddles spread with lime. The condensing or cooling pipes are arranged vertically 19 lengths backward and forwards 11 feet long; or, allowing for bends, 231 feet lineal of 6-inch pipe, or 363 sup. feet of cooling surface. Water is allowed to run over these pipes, and, in addition, there is a chamber exposed to the air 16 inches square and 18 feet long, through which the gas first passes.

"Five men by day and two by night are employed to attend the works; *these men are all prisoners, and are continually changed,* so that the conditions are not at all favourable to extreme economy.

"The following table shows the make and cost of the gas for the year 1849, and half of 1850:—

WAKEFIELD HOUSE OF CORRECTION.

For the Year ending December 1849—"*Gas Statement.*"

	Tons.	Price per ton deliv.	£ s. d.	REMARKS.
		s. d.		
Firing coal used	516	3 9	96 17 4	Much higher than it ought to be, owing to not having a more economical arrangement of retorts to one fire.
Coal for the retorts	740	4 9	175 16 11	Producing 7000 feet per ton, or 5,180,000 feet per annum, or 14,200 per day.
Lime for purifying the gas	..	..	25 19 10½	
Repairs of retorts, and nine extra ones not previously required	..	..	164 12 7½	
Gas fittings and repairs of do. in cells and passages inside the prison	..	..	25 13 4	This charge has nothing whatever to do with the making of gas; it would in ordinary cases be paid by the consumer.
			489 0 1	
Received for coke sold	494	7 11	195 18 4	13½ cwt. produce for 1 ton of coal.
Leaving gross cost of gas and fittings	..	..	293 1 9	
Deduct gas fittings as above	..	..	25 13 4	
The actual cost of the gas for 1849	..	..	267 8 5	Or 1s. 0½d. per thousand feet.
Labour done by prisoners and prison officers occasionally inspecting the Gas Works.				

"*Gas Statement*"—*Half Year ending June* 30, 1850.

	Tons.	Price per ton deliv.	£ s. d.	REMARKS.
		s. d.		
Firing coal used	250	3 9	46 19 5½	See remarks for 1849.
Coal for the retorts	325	5 6	89 0 7½	Producing 7000 feet per ton, or 2,275,000 feet the half year, or 12,500 per day.
Lime for purifying the gas	..	..	26 17 5	
Repairs of retorts, &c.	..	..	6 7 9	
Gas fittings and repairs of do. in cells and passages inside the prison, and the wages of a paid gasfitter	..	..	78 13 9	See remarks for 1849.
			247 19 0	
Received for coke sold	249	6 7	81 18 6	The coal of better quality and yielding more coke, 14 cwt. produced from one ton of coal.
Leaving gross cost of gas and fittings	..	..	166 0 6	
Deduct gas fittings as above	..	..	78 13 9	
The actual cost of the gas for the half year ending 30th of June, 1850.	..	..	87 6 9	Or 9¼d. per thousand feet.
Labour done by prisoners and prison officers occasionally inspecting the Gas Works.				

Shade of "Experimentum Crucis," is this possible? 325 tons of coal distilled, with 250 tons used as fuel, in one half year, and 740 tons, with 510 tons as fuel, in the preceding year, and this with clay retorts too!! Why, Mr. Croll pledges himself to distil a ton of coal with *less than* 3 *cwt. of fuel,* and at the model gas works of the Wakefield House of Correction the consumption *is from* 14 *cwt. to upwards of* 15 *cwt.*, and yet, after all, the "actual cost of the gas is only 9¼d. per 1000 feet," if these statements are to be believed! But in reality, with the exception of £6. 7s. 9d. for

repairs of the retorts during six months of the period, the whole of the expenditure is for *coal and lime alone*, so that, properly speaking, the charge for these would be about 9d. per 1000 feet, to which wear and tear, labour, salaries, interest of capital, &c., would have to be added, were the establishment carried on by a body of proprietors. Are we, then, to take this sum as the cost of coals and lime for making gas in localities where retort coal is worth 5s. 6d., and furnace coal 3s. 9d., per ton, and where coke is saleable at 6s. 7d. per ton? Such would appear to be the opinion of the writer of the article above quoted, and, as he gives quantities, we can easily transfer the scene to other localities where the prices may be higher or lower, and adapt the same thereto, and work out the results.

Every one has heard of the Model Prison at Pentonville. It was one of the pattern cards of the "cheap gas" people two years since, but when the accounts came to be dissected it was proved that, the usual charges of a gas company being included, and interest upon the capital expended, the gas cost something like 8s. 6d. per 1000 feet. Suppose this Model Gas Work at Wakefield to be transposed to the Model Prison at Pentonville, and worked with Newcastle coal at London prices, on the system so highly recommended by our contemporary, the account for six months would stand thus:—

325 tons of retort coal, at 15s.	£243	15	0
250 tons of furnace coal, at 12s. 6d.	156	2	6
Lime	26	17	5
	426	14	11
Received for 325 chaldrons of coke, sold at 10s.	162	10	0
	264	4	11

cost of coals and lime for 3,006,250 feet of gas (9250 feet per ton of coals) being at the rate of more than 1s. 9d. per 1000 feet, whereas Mr. Croll's estimate for exactly similar charges is less than 9d. out of 1s. 4½d.

Certes, after this exposure the agitators must be careful how they venture to give details. We are fortunately unacquainted with any manager of a gas work who would not blush in putting before the public such a gratuitous advertisement of his want of skill, though it is no disgrace for the governor of a prison to make such a confession as these accounts amount to.

GAS LIGHTING IN GERMANY.

HAMBURG.

(*Continued from page* 9.)

Art. 17. But should the company not, within three months after the diminished illuminating power compared with that stipulated for is shown, or, in case of the navigation being obstructed, within two months after the opening of the navigation, produce the normal or standard illuminating power of 12 wax lights, be it by increasing the quantity of gas or by the larger consumption of superior coals than till then they may have made use of; and should they not be able to deliver with 5 cubic feet of gas the illuminating power of 10 wax lights, then, instead of the prices agreed to in the following article (the contract being in other respects unchanged), the following prices shall be paid:—

a. For the street lighting, 2 marks currency (2s. 4½d.) for 1000 (Hamburg) cubic feet.

b. For the lighting public buildings, and such buildings considered as similar, a maximum of 4 marks currency (4s. 9d.) per 1000 (Hamburg) cubic feet.

c. For the lighting of private houses, a maximum of 5 marks currency (5s. 11¼d.) per 1000 (Hamburg) cubic feet.

The light which the company have before given by means of 5 Hamburg cubic feet of gas per hour shall be taken as the normal or standard illuminating power, unless the same has been below 9 wax lights. If it had been less the company is bound to give the required illuminating power for the public and private lights by an increased quantity of gas without extra payment for this increase, and proper burners must also be furnished at the cost of the company.

This reduced price ceases, however, and the former prices shall be paid again, if the company shall have, during 3 months, delivered a gas to the full satisfaction of the Exchequer authorities, giving the illuminating power of ten wax candles for 5 cubic feet.

Art. 18. The prices for the street lamps, according to the "Lighting Calendar" for 1843, is 38 marks and 14½ schillings, Hamburg currency (£2. 6s. 4d.), each.* The quarterly accounts shall be made by calculating 3 marks Hamburg currency (3s. 6¾d.) for each 1000 cubic feet, at the consumption of 5 cubic feet per hour, for all lights burning up to midnight, and 2½ cubic feet per hour for all burning after midnight, without regard to whether the company must employ more than 2½ cubic feet for obtaining the illuminating power of 5 wax candles after midnight, nor whether, instead of 5 cubic feet to obtain for the public lighting the illuminating power of 12 candles, must employ more than 5 cubic feet. Payment shall be made for lamps which in public places burn more than 5 cubic feet per hour, and for a greater consumption in cases of fire or other unusual occasion, according to the price of 3 marks Hamburg currency for 1000 cubic feet, or that greater quantity which produces not less than the power of 12 candles.

When the Exchequer authorities, in pursuance of Art. 12, shall order lamps of 2½ cubic feet per hour for the whole night, in certain or narrow streets or in alleys, these shall be only reckoned according to the fixed measure of 2½ cubic feet, or, if for obtaining the illuminating power of 5 wax candles, a greater quantity of gas be required.

Lamps at or above the house-doors of private persons, which may be considered as contributing to the lighting of the streets, must be supplied with gas by the company at the same price as the street lamps; the company is, however, in regard to these under contract solely with the State, not with private persons.

Lamps which also light an interior part of a house shall, on the contrary, be paid for by private persons, like any other internal lights.

The price of 1000 cubic feet of gas for the internal lighting of public buildings of the State, or public institutions, or that are destined for public purposes, as also for the whole of the charitable institutions, shall not exceed 5 marks Hamburg currency (5s. 11¼d.) per 1000 Hamburg cubic feet; and in case of any diminution of price on the part of the company for private lights, these shall always be supplied at the lowest prices.

The price for private lights must not exceed 6 marks Hamburg currency (7s. 1¼d.) for 1000 cubic feet.

When the yearly consumption of gas of the best quality shall have amounted to 150 millions of Hamburg cubic feet, then a reduction in the price fixed for the public lights, as well as in the maximum amounts for the private lights, of 4 schillings Hamburg currency (3.56d.) per 1000 cubic feet shall take place; and for every 60 millions of Hamburg cubic feet more a further reduction yearly of 2 schillings Hamburg currency (1.78d.) per 1000 cubic feet.

Should, however, the export duty on coals in England be increased, or an import duty be imposed of more than ½ per cent., the company are entitled to add this increase; but, in the event of a reduction of the duty, they must reduce, on the basis that 1s. sterling per ton shall make 2 sch. Hamburg currency per 1000 feet.

The company must bear the cost of the branch pipes to the boundaries of the private property for all internal lights.

(*To be continued.*)

* CALCULATION OF PRICE.

1810 hours before midnight, at 5 cubic feet,	9050 cubic feet, at 3m. per 1000,	27. 2
1567 hours after midnight, at 2½ cubic feet,	3918 cubic feet, at 3m. per 1000,	11.12
3377½ hours	12968½ cubic feet	38.14

PROVINCIAL NOTES.

MANCHESTER GAS WORKS.

Most persons connected with gas works in this country are aware that for upwards of twenty-five years the gas works of the town of Manchester have belonged to the corporation of that city, and have been carried on for account of the inhabitants by a committee of the members of the town council, under the direction of a special officer known as the Comptroller. Few, however, except those resident in or near the locality, are acquainted with any of the details of the operations of this important branch of the municipal establishments of the manufacturing capital of the empire; but, as all the accounts connected with it are audited and published in the local papers, they form authentic records from which every one connected with gas works may derive valuable information, and refute many inaccurate assertions. We have collected from the sources above mentioned, the treasurer's published accounts for the last three years, and from these any one acquainted with the keeping of the accounts of a large gas works will readily make up a profit and loss account, and ascertain the expenditure in each department of the work.

The coal used is principally Wigan cannel, and the gas extracted ranges from 11,700 to 12,000 feet per ton; its average cost, as given in Mr. Hume's return, was 15s., 15s. 6d., and 15s. 6d. during the three years embraced in these accounts, and the price of gas to the private consumer is stated in the same return to be 4s. 9d. per 1000 feet; but this must be the average, as the actual charge for gas per meter is 5s. per 1000 feet, subject to the following discounts when the annual consumption amounts to

200,000	cubic feet, and is under	400,000	feet,	2½	per cent.
400,000	,,	600,000	,,	5	,,
600,000	,,	800,000	,,	7½	,,
800,000	,,	1,200,000	,,	10	,,
1,200,000	,,	2,000,000	,,	12½	,,
2,000,000	,,	3,000,000	,,	15	,,
3,000,000	,,	5,000,000	,,	17½	,,
5,000,000	,, and upwards			20	,,

In rentals of less than £50 per annum the charge is consequently 5s. per 1000 feet. Coke is extremely difficult of sale, the maximum price now being 3s. 4d. per ton, and where five tons or upwards are taken in one week the charge is only 2s. 6d. per ton. Of public lights there are now nearly 6000, each burning 3390 hours per annum. They are of two classes: the larger ones consuming 3½ feet per hour, or 11,770 feet per annum, and paid for by the lighting committee at the rate of £2 per lamp; and the smaller ones consuming 1⅓ feet per hour, or 4520 feet per annum, and paid for at the rate of £1. 2s. per lamp. The lighting, cleaning, and repairing is an additional charge of about 16s. 2d. per lamp incurred by the lighting committee beyond the above charges, which are for the gas alone. The prices of gas to the large private consumer, and for the public lights, are consequently nearly equal.

REPORT OF THE MANCHESTER GAS COMMITTEE, SHOWING THEIR ASSETS AND ENGAGEMENTS.—JUNE 24, 1848.

PERMANENT ASSETS.

No. 1, or Water-street Station.

OLD WORKS.

	£	s.	d.	£	s.	d.	£	s.	d.
Expenditure previous to the Act of 1824:—									
Land	3,800	0	0						
Buildings and apparatus	21,000	0	0						
				24,800	0	0			
NEW WORKS.									
Land	1,500	0	4						
Buildings	86	0	8						
Apparatus	6,076	2	7						
				7,662	2	11			
Works completed since last report				597	6	2			
Advances on account of works not yet completed				2,838	19	3			
Total at No. 1 Station							35,898	8	4

No. 2, or St. George's-road Station.

Expenditure for objects completed as per last report:—									
Land	2,368	14	8						
Buildings	12,936	14	4						
Apparatus	34,688	0	5½						
Paving Gould-street, Dewhurst-street, and yard	964	9	10						
				50,957	19	3½			
Levelling ground, superintendent's salary, and petty expenses during the erection of the works	901	14	4						
				51,859	13	7½			
Works completed since last report				2,681	4	0			
Total at No. 2 Station							54,540	17	7½

No. 4, or Holt-town Station.

Land	1,789	16	6						
Buildings	1,472	13	7						
Apparatus	10,992	13	7						
Paving Every-street	114	1	6						
Total at No. 4 Station							14,369	5	2

No. 5, or Hulme Station.

Land bought from Mr. James Fernley	6,282	0	0						
Buildings and apparatus	6,120	0	0						
				12,402	0	0			
WORKS COMPLETED SINCE PURCHASED FROM MR. FERNLEY.									
Land	3,761	8	6						
Buildings	4,722	2	6						
Apparatus	9,750	5	7						
Paving Finch-street and yard	314	3	10						
				18,548	0	5			
Works completed since last report				1,264	1	0			
Advances on account of works not yet completed				36,151	13	8			
Land purchased for extension of station				15,000	0	0			
				63,365	15	1			
Deduct: Surplus proceeds from sale of No. 3 Station				2,014	11	9			
Total at No. 5 Station							81,351	3	4

Scavengers'-yard, St. George's-road.

Land	685	12	8						
Buildings	709	12	10						
							1,395	5	6

This yard was given up to the scavenging committee for their yard adjoining the gas works, Gould-street, St. George's-road.

Street Mains.

OLD WORKS.

Expenditure previous to the Gas Act of 1824:—									
Mains	7,800	0	0						
Service pipes	1,400	0	0						
				9,200	0	0			
Streets laid subsequent to the Gas Act of 1824—103 miles 763 yards				72,475	5	1½			
Expenditure since last report:—									
Mains, 4 miles 964 yards	2,066	7	9						
Service pipes	346	16	6						
Labourers' wages	438	14	5						
	2,851	18	8						
Deduct amount of main and service pipes taken up in sundry streets	220	0	6						
				2,631	18	2			
Total in the streets							84,307	3	3½
Total permanent assets							271,862	3	3

FLOATING ASSETS.

Materials on hand							8,160	19	2½
Gas rents outstanding							10,810	15	7
Purchase money due from South Junction Railway Company, exclusive of interest							15,000	0	0
Old materials sold at No. 3 Station outstanding							198	10	10
Sundry accounts owing for naphtha, sulphate ammonia, &c.							350	5	3
Sureties of W. H. Coleman							128	9	1
Balance in bankers' hands							346	7	2
Balance in treasurer's hands							439	0	5
							35,434	7	6½
							307,296	0	9½

ENGAGEMENTS.

MORTGAGE DEBT.

	£	s.	d.	£	s.	d.
Amount borrowed under act of 1824	6,850	0	0			
Amount borrowed under act of 1830	9,300	0	0			
Amount borrowed under act of 1831	19,200	0	0			
Amount borrowed under act of 1837	62,400	0	0			
				97,750	0	0

SIMPLE CONTRACT DEBTS.

To purchase of land adjoining No. 5 Station: balance	7,000	0	0			
Scavenging committee, for portion of their land sold to South Junction Railway Company	1,853	5	0			
Sundry persons for cannel, &c.	3,170	11	0			
Do. for fire bricks	142	4	3			
Do for muriate of lime, &c.	131	9	8			
Do. for ironwork	97	2	0			
Do. for poundage	87	7	3			
Do. for bricks, lime, &c.	75	18	1			
Do. for joiners' work, &c.	58	13	9			
Do. for pipes and tubing	47	1	2			
Do. for paving	41	15	1			
Do. for stonework	28	2	0			
Do. for chief rent	24	1	0			
Do. for stationery, &c.	19	5	0			
Do. for sundry articles	63	16	8			
				12,840	11	11
Total engagements				110,590	11	11
Excess of assets				196,705	18	10½
				307,296	10	9½

RECEIPTS AND DISBURSEMENTS OF THE GAS COMMITTEE FOR THE YEAR ENDING 24TH JUNE, 1848.

Dr.	£	s.	d.
To Cash balance in treasurer's hands June 24, 1847	372	18	5
„ Balance in bankers' hands, June 24, 1847	14,225	19	7
„ Gas rents received	62,678	14	5
„ Ditto street lamps	7,737	18	9
„ Ditto Choriton lamps	330	12	2
„ Sal ammoniac sold	3,233	0	9½
„ Coke, &c., sold	2,747	10	6½
„ Meters, &c., sold	1,894	2	1
„ Naphtha, &c., sold	1,555	19	11
„ Loan upon mortgage	1,000	0	0
„ Old materials at No. 3 Station	380	15	3
„ Laying mains	248	10	2
„ Old metal	143	18	9½
„ Meters repaired	3	9	0
„ Fines levied	2	2	6
	96,555	16	4½

Total quantity of gas made in the year, 341,359,000 feet.

Cr.	£	s.	d.
By Improvement committee, surplus from private rental	21,000	0	0
„ Improvement committee, surplus from lamp rental	7,179	3	8
„ Cannel	18,557	10	2
„ Wages of manager, superintendents, clerks, retortmen, labourers, and others employed in the works	13,979	19	4
„ Purchase of land, paid on account	8,000	0	0
„ New gasholder and apparatus	5,140	15	2
„ Iron and ironwork	4,638	4	6
„ Interest on loans	3,718	15	3
„ Bricks, lime, sand, &c., including brickwork and stonework	2,407	6	1
„ Meters and meter boxes	2,175	12	0
„ Main and service-pipes for streets	1,627	7	0
„ Income tax, chief rents, &c.	1,452	13	1
„ Muriate of lime, spirit of salts, &c.	905	3	9
„ Poundage to collectors	834	19	5
„ Mortgage debt redeemed	750	0	0
„ Fire-bricks for retorts	741	0	3
„ Painting, plumbing, joiners' work, and slating	1,006	12	3
„ Carting, cement, oil, rope-yarn, &c.	810	7	10
„ Law expenses in connection with purchase of land	252	11	1
„ Bankers' commission, &c.	236	13	1
„ Casual expenses, stationery, printing, and advertising	322	8	9
„ Petty expenses	32	6	1½
„ Balance in bankers' hands	346	7	2
„ Balance in treasurer's hands	439	0	5
	96,555	16	4½

REPORT OF THE MANCHESTER GAS COMMITTEE, SHOWING THEIR ASSETS AND ENGAGEMENTS.—JUNE 24, 1849.

PERMANENT ASSETS.

No. 1, or Water-street Station.

OLD WORKS.

	£ s. d.	£ s. d.	£ s. d.
Expenditure previous to the Gas Act of 1824:—			
Land	3,800 0 0		
Buildings and apparatus	21,000 0 0		
		24,800 0 0	
NEW WORKS.			
Land	1,500 0 4		
Buildings	86 0 0		
Apparatus	6,673 8 9		
		8,259 9 1	
Works completed since last report		2,872 5 3	
Total at No. 1 Station			35,931 14 4

No. 2, or St. George's-road Station.

(This station was established in 1824.)

Expenditure for objects completed, as per last report:—		
Land	2,368 14 8	
Buildings	13,975 10 10	
Apparatus	36,330 7 11½	
Paving Gould-street, Dewhurst-street, and yard	964 9 10	
	53,639 3 3½	
Levelling ground, superintendent's salary, and petty expenses during the erection of the works	901 14 4	
	54,540 17 7½	
Works completed since last report	338 17 6	
Total at No. 2 Station		54,879 15 1½

No. 4, or Holt-town Station.

(This station was established in 1833.)

Land	1,789 16 6	
Buildings	1,472 13 7	
Apparatus	10,992 13 7	
Paving Every-street	114 1 6	
Total at No. 4 Station		14,369 5 2

No. 5, or Hulme Station.

(This station was purchased in 1837.)

Land bought from Mr. James Fernley	6,282 0 0	
Buildings and apparatus	6,120 0 0	
	12,402 0 0	

WORKS COMPLETED SINCE PURCHASED FROM MR. FERNLEY.

Land and buildings	24,566 7 10	
Apparatus	9,931 9 9	
Paving Finch-street and yard	314 3 10	
	34,812 1 5	
Works completed since last report	36,385 11 4	
	83,599 12 9	
Deduct: Surplus proceeds from sale of No. 3 Station	2,014 11 9	
Total at No. 5 Station		81,585 1 0

Scavengers'-yard, St. George's-road.

Land	685 12 8	
Buildings	709 12 10	
		1,395 5 6

This yard was given up to the scavenging committee for their yard adjoining the gas works, Gould-street, St. George's-road.

Street Mains.

OLD WORKS.

Expenditure previous to the Gas Act of 1824:—			
Mains	7,800 0 0		
Service pipes	1,400 0 0		
		9,200 0 0	
Streets laid subsequent to the Gas Act of 1824—107 miles 1727 yards		75,107 3 3½	
Expenditure since last report:—			
Mains, 2 miles 1586 yards	1,637 7 7		
Service pipes	368 8 0		
Labourers' wages	295 18 1		
	2,301 13 8		
Deduct amount of main pipes taken up in sundry streets	342 1 9		
		1,959 11 11	
Total in the streets			86,266 15 2½
Total permanent assets			274,427 16 4

FLOATING ASSETS.

Materials on hand	10,441 4 10	
Gas rents outstanding	12,264 9 11	
Sundry accounts owing for sal ammoniac, tar, laying pipes, &c	1,125 3 5	
Sureties of W. H. Coleman	128 9 1	
Balance in bankers' hands	4,309 17 9	
Balance in treasurer's hands	394 15 8	
		28,664 0 8
		303,091 17 0

ENGAGEMENTS.

MORTGAGE DEBT.

Amount borrowed under act of 1830	9,300 0 0	
Amount borrowed under act of 1831	10,200 0 0	
Amount borrowed under act of 1837	72,500 0 0	
		92,000 0 0

SIMPLE CONTRACT DEBTS.

To sundry persons for cannel	4,195 10 6	
Ditto iron and ironwork	330 10 6	
Ditto meters	105 9 6	
Ditto poundage	81 12 7	
Ditto paving	76 2 8	
Ditto muriate of lime, &c.	72 10 2	
Ditto joiners' work, plumbing, and slating	52 7 0	
Ditto carting and yarn	48 9 0	
Ditto lime, bricks, and sand	43 14 6	
Ditto fire bricks	41 9 0	
Ditto painting and oil	29 19 0	
Ditto chief rent	24 1 0	
Ditto sundries	70 1 3	
		5,171 13

Total engagements		97,171 16 8
Excess of assets		205,920 0 4
		303,091 17 0

RECEIPTS AND DISBURSEMENTS OF THE GAS COMMITTEE FOR THE YEAR ENDING 24th JUNE, 1849.

Dr.	£ s. d.
To Cash balance in treasurer's hands 24th June, 1848	439 0 5
„ Balance in banker's hands 24th June, 1848	345 7 2
„ Gas rents received	66,977 15 8
„ Ditto street lamps	7,257 10 9
„ Ditto Chorlton lamps	1,206 11 7
„ Sale of No. 3 Station, with interest	15,533 1 3
„ Coke, &c., sold	1,998 18 2½
„ Naphtha and tar sold	1,899 11 5
„ Meters sold	1,832 19 11
„ Sal ammoniac, &c., sold	1,568 12 6
„ Repairing and fixing lamps	369 18 3
„ Old materials at No. 3 Station	198 10 10
„ Laying mains	176 8 7
„ Old metal sold	13 17 4
„ Meters repaired	3 1 2
„ Fines levied	2 2 6
„ Interest allowed by bankers	26 8 4

Total quantity of gas made during the year, 379,455,600 feet.
Maximum daily make of gas, 2,522,000 feet.
Minimum daily make of gas, 306,000 feet.

	99,850 15 10½

Cr.	£ s. d.
By Improvement committee	27,665 11 5½
„ Chorlton-on-Medlock committee	1,629 2 8
„ Cannel	22,413 16 6
„ Wages of manager, superintendents, clerks, retortmen, labourers, and others employed in the works	13,132 3 6
„ Purchase of land (balance)	6,893 13 2
„ Mortgage debt redeemed	5,750 0 0
„ Interest on loans	3,657 14 5
„ Iron and ironwork	3,739 5 1
„ Lamp committee—land at No. 3 Station	2,077 2 8
„ Meters and boxes	1,601 5 1
„ Main and service pipes, and paving for streets	1,262 4 9
„ Income tax, chief rents, and taxes	1,201 8 4
„ Poundage to collectors	868 12 9
„ Muriate of lime, muriatic acid, &c.	603 3 3
„ Lime, bricks, and sand	594 4 11
„ Fire bricks for retorts	407 7 6
„ Casual expenses	301 12 11
„ Joiners' work and slating	274 9 7
„ Carting, oil, tallow, and tarred yarn	333 4 8
„ Plumbing, painting, and stonework	397 0 3
„ Cannel barrows, tools, &c.	142 15 0
„ Stationery, printing, and advertising	101 17 9
„ Commission to bankers	81 6 8
„ Law expenses	16 19 7
„ Balance in bankers' hands	4,309 17 9
„ Balance in treasurer's hands	394 15 8
	99,850 15 10½

REPORT OF THE MANCHESTER GAS COMMITTEE, SHOWING THEIR ASSETS AND ENGAGEMENTS.—JUNE 24, 1850.

PERMANENT ASSETS.

No. 1, or Water-street Station.

OLD WORKS.

Expenditure previous to the Gas Act of 1824:—

	£	s.	d.	£	s.	d.	£	s.	d.
Land	3,800	0	0						
Buildings and Apparatus	21,000	0	0						
				24,800	0	0			
NEW WORKS.									
Land	1,500	0	4						
Buildings	86	0	0						
Apparatus	9,545	14	0						
				11,131	14	4			
Total at No. 1 Station							35,931	14	4

No. 2, or St. George's-road Station.

(This station was established in 1824.)

Expenditure for objects completed as per last report:—									
Land	2,368	14	8						
Buildings	13,066	3	10						
Apparatus	37,578	12	5½						
Paving Gould-street, Dewhurst-street, and yard	964	9	10						
	53,978	0	9½						
Levelling ground, superintendent's salary, and petty expenses during the erection of the works	901	14	4						
Land, &c., received in exchange for scavengers' yard, St. George's-road	1,395	5	6						
				56,275	8	7½			
Advances on account of works not yet completed				84	12	7			
Total at No. 2 Station							56,359	13	2½

No. 4, or Holt-town Station.

(This station was established in 1832.)

Land	1,789	16	6						
Buildings	1,472	13	7						
Apparatus	10,992	13	7						
Paving Every-street	114	1	6						
Total at No. 4 Station							14,369	5	2

No. 5, or Hulme Station.

(This station was purchased in 1837.)

Land bought from Mr. Jas. Fernley	6,282	0	0						
Buildings and Apparatus	6,120	0	0						
				12,402	0	0			
WORKS COMPLETED SINCE PURCHASED FROM MR. FERNLEY.									
Land	18,789	16	2						
Buildings	25,248	0	5						
Apparatus	26,845	12	4						
Paving Finch-street and yard	314	3	10						
				71,197	12	9			
Advanced on account of works not yet completed				1,351	10	10			
				84,951	3	7			
Deduct surplus proceeds from sale of No. 3, station				2,014	11	9			
Total at No. 5 Station							62,936	11	10

Street Mains.

OLD WORKS.

Expenditure previous to the Gas Act of 1824:—									
Mains	7,800	0	0						
Service Pipes	1,400	0	0						
				9,200	0	0			
Streets laid subsequent to the Gas Act of 1824, 110 miles 1353 yards				77,066	15	2½			
Expenditure since last report:—									
Mains, 8 miles 1403 yards	8,089	16	6						
Service pipes	508	9	2						
Labourers' wages	700	15	4						
	9,299	1	0						
Deduct amount of main pipes taken up in sundry streets	2,969	12	7						
				6,329	8	5			
Total in the streets							92,596	3	7½
Permanent assets							282,193	8	2

FLOATING ASSETS.

Materials on hand				10,175	5	4			
Gas rents outstanding				12,957	5	4			
Advanced on account of new works				1,038	13	0			
Sundry accounts owing for repairing lamps, old metal, tar, &c.				1,123	17	9			
Sureties of W. H. Coleman				128	9	1			
Balance in bankers' hands				3,234	5	9			
Balance in the treasurer's hands				596	2	3			
							29,253	18	6
							311,447	6	8

ENGAGEMENTS.

MORTGAGE DEBT.

	£	s.	d.	£	s.	d.
Amount borrowed under act of 1830	8,500	0	0			
Amount borrowed under act of 1841	7,900	0	0			
Amount borrowed under act of 1837	73,950	0	0			
				90,350	0	0

SIMPLE CONTRACT DEBTS.

To sundry persons for cannel	3,099	14	0			
Ditto iron and ironwork	762	13	6			
Ditto acid, muriate lime, &c.	159	14	9			
Ditto poundage	151	11	5			
Ditto meters	112	0	6			
Ditto carting	96	2	4			
Ditto pipes, tubing, and paving	90	7	11			
Ditto lime, bricks, and sand	89	6	6			
Ditto fire bricks	65	5	0			
Ditto joiners' work	38	8	6			
Ditto stationery and advertising	37	14	3			
Ditto sundries	63	2	6			
				4,756	1	2
Total engagements				95,106	1	
Excess of assets				216,341	5	6
				311,447	6	8

RECEIPTS AND DISBURSEMENTS OF THE GAS COMMITTEE, FOR THE YEAR ENDING 24TH JUNE, 1850.

Dr.	£	s.	d.
To Cash, balance in treasurer's hands, June 24, 1849	394	15	8
„ Balance in bankers' hands, June 24, 1849	4,309	17	9
„ Gas rents received	77,270	14	11
„ Ditto street lamps	7,292	3	10
„ Ditto Chorlton lamps	1,266	7	1
„ Sal ammonia, &c., sold	3,073	7	1
„ New loans on mortgage	2,700	0	0
„ Meters sold	2,382	6	1
„ Naphtha and tar sold	2,156	16	4
„ Coke sold	2,112	19	0
„ Fixing and repairing lamps	433	8	8
„ Laying pipes, &c.	249	2	5
„ Interest allowed by bankers	83	6	0
„ Old metal sold	6	12	1
„ Fines levied	2	15	0
Total quantity of gas made, 401 million feet.			
	103,724	11	11

Cr.	£	s.	d.
By Improvement committee	31,279	7	10
„ Chorlton-upon-Medlock committee	1,528	13	10
„ Cannel	21,115	0	0
„ Wages of manager, superintendents, clerks, retort men, labourers, and others employed in the works	16,271	8	0
„ Main and service pipes, paving, &c., for streets	5,368	13	1
„ Loans repaid	4,350	0	0
„ Interest on mortgage debt	3,501	4	0
„ Iron and ironwork	3,378	0	9
„ Meters and meter boxes	2,190	4	3
„ Income-tax, rates, and chief rents	2,086	14	11
„ Collectors' poundage	960	17	8
„ Excavating for new pit	812	12	0
„ Lime, bricks, and sand	796	3	0
„ Fire bricks, &c., for retorts	704	3	0
„ Carting	467	7	11
„ Casual expenses	407	6	5
„ Joiners', masons', and brickwork	404	7	1
„ Muriate lime, acid, oil, vitriol, &c.	303	9	0
„ Coke, hay, blacking, &c., for foundry	209	5	11
„ Tarred yarn, oil, and tallow	188	3	2
„ Old metal	183	18	0
„ Plumbing, painting, and slating	159	18	0
„ Stationery, advertising, and printing	111	3	3
„ Cannel barrows, shovels, riddles, &c.	105	19	0
„ Bankers' commission, &c.	80	3	10
„ Balance in the bankers' hands	3,234	5	9
„ Balance in the treasurer's hands	596	2	3
	103,724	11	11

Correspondence.

ON STREET-LIGHTS.

SIR,—In the last number of the JOURNAL OF GAS LIGHTING, I was (and no doubt many others connected with the manufacture and distribution of gas were) much pleased to find an article on street-lights; a subject well deserving the attention of both gas companies and gas consumers. As the subject is there treated by the talented writer in his usual explicit and interesting manner, and as we may expect from his concluding remarks that he will again favour us with another article on the same subject, although I, among many others, might, perhaps, write much thereon, I forbear, feeling that it cannot be left in abler hands than those of that gentleman to deal with the present evil system of charging for street-lights.

It may not, however, be uninteresting to some of the readers of this valuable journal, and to the gentleman who has written so much for the mutual good of gas companies and of gas consumers, to know that the plan of charging the lighting authorities by meter has been tried with success. In no part of his remarks last month does he state that he is aware of its having been *actually* done, and on this account I have ventured to make the following statements; but if he is, should these remarks be deemed worthy of insertion, they may be taken as so much more evidence of its perfect practicability and good results to the other consumers.

Last winter (1849 and 1850) this manufacturing and seaport town was lighted as usual, but with this difference; that all the gas consumed by the public lights was paid for by meter, as the gas company refused to supply it on any other terms, so confident were they that the commissioners had not paid previously for all they had burnt; besides which, the gas company were determined to act on the principle now advocated of protecting their own interests and that of their consumers in general, the whole of whom only twelve months before had been compelled to take meters (which are supplied at a low rent), or cease burning gas. (The advantage gained by this regulation enabled the gas company to allow a discount to the consumers of 6d. per thousand feet.) The result was that the commissioners had to pay 20 per cent. more than they did in 1848-9 for the same number of lamps. The gas company, always desirous of reducing its price to the lowest remunerating rate, knowing that this is the sound principle to act upon, to increase their make and consumption and to keep out competition, as well as to show the other consumers that they were the parties who would receive benefit from an equalized rate of charge, threw this 20 per cent. into their pockets, in the shape of a further discount on their gas account when paid within one month after due. This amounted to 4d. per thousand feet.

The mode of ascertaining the quantity burnt was by attaching a meter to one-eighth of the number of lamps, betwixt the main and the post, care being taken to pack each meter in a box filled up with sawdust. They were placed in situations where the various pressures would influence the registration. The average register of these was taken as the base of calculation for the whole: the price charged was the lowest rate to the manufactories. This year the mode is different, partly on account of the difficulty experienced in keeping the meters dry, and uninfluenced by the frost, &c., and partly from a desire to meet the views of the commissioners, who objected to the expense and the annoyance of breaking up the streets, &c. The same principle is still adhered to of charging by quantity, though the result may not be, perhaps, so correct as by meter.

The plan is, to test by an experimental meter all the burners used periodically: these being marked or numbered of the various sizes required by the contract, the pressure by average of the town is ascertained and maintained at the meter, an agent of both parties being present. The various burners are then ready to be fixed on the lamp-posts assigned to them: these are likewise numbered, and, being noted down in a book kept for both parties, we have an account of what every lamp in the town ought to be burning: this being maintained, we calculate the total consumpt per hour, and as the lamps are lighted from one given time to another, and an account kept, we arrive at a charge for quantity consumed.

The commissioners have power to alter the time of lighting and putting out as occasion requires within certain limits, notice being given to the gas company, and each party's servants inspect the lights at any time. If any burner is thought incorrect, it may be taken off betwixt the periodical testings; and, if found so, replaced by a correct one. The expenses of testing, &c., are paid jointly by both parties, this serving as a check to needless testings being required.

As far as tried this season, this mode is likely to show nearly the same result as to quantity consumed as by meter indication last year. The price charged is the same as before, viz., the lowest price to the manufactories.

A properly-adapted registering machine for street-lights would be a great boon to gas companies, and to their consumers in general, as a protection to both. If this company's general body of consumers be taken as an example, other companies have only to lay in figures before their consumers *proved facts*, as to the amount extra they are paying for their gas on account of the public at large, represented by the authorities (for these authorities are the public's board of directors), not paying their due share of a necessary expense, from which all, whether consumers of gas, privately or not, receive accommodation and benefit; and they will find that these consumers, when they see their own interests cared for by the gas company, will back them through the contest they engage in with the "would-be economists" for the many, at the expense of the few.

In the absence of a machine or instrument adapted for registering the gas for the public lights, various modes may be resorted to to obtain an approximation. I have given two which work with us, and might, perhaps, do with some others; but I am quite aware that in other places one or both these plans would be objectionable, and that others would have to be devised; but, if the hints thrown out here be of any use to only a single gas company, I shall feel glad that they were penned. In conclusion I would only remark that, as there are two or three burners, with self-regulating apparatus attached, stated to be able to maintain an uniform flame, possibly these might be substituted for the common burner, if not too expensive, for street-lights; and, the quantity consumed per hour being decided, it would be easy to ascertain with tolerable accuracy the number of hours burnt, or stipulate for a number and work to it; the quantity used per lamp is then known. This will furnish ground for calculation and argument to set against that of opponents; and, if they allow that gas in one town should be cheaper or dearer than in another by the thousand feet, they surely will allow that the price of street-lights, so far as gas is concerned, should vary in proportion. Convince them of this, and they ought to allow that every town should have a bargain of its own; and where can they start from if this is allowed?

I think as purchasers they must say what they want, viz., a number of gaslights, burning so many hours per night, size of burner, such and such; these being given, the gas company know what is wanted, and should fix its price per thousand accordingly. If the authorities object to this fair mode of payment for their gas, appeal to the rest of the consumers, and ask if your offer is not the more just of the two for all parties. I think they will, in nine cases out of ten, support the gas company, when they have facts proved before them, showing that they, not the gas company alone, are suffering from the evil practice of charging for street-lights in the mode generally practised.

If the consumers in general and gas company be on one side, and constituting, as they mostly do, the more numerous and influential body of citizens or townsmen, when roused in self-defence, can the authorities, with a minority, carry the day? I think not; and need only say, they have been tried and found wanting.

J. D.

Middlesbro'-on-Tees, 2nd month, 1851.

Miscellaneous News.

WESTERN METROPOLITAN GAS QUESTION.

MARYLEBONE VESTRY.—JAN. 11.

Mr. GLASIER, pursuant to notice, brought forward his motion for the permission of the vestry to allow the Western Gas Company to lay down their mains in Oxford-street. He alluded to the experiments which had been tried between that company and the Chartered Company to prove the superiority of the Western gas, and the fact of their having been admitted to lay down their mains in St. George's, Hanover-square, and St. James's, Westminster, as a proof that the advantages of the company were appreciated. They need not be under any apprehension about breaking up the street, as the company would undertake to complete their mains in Oxford-street in eight days, the same as they had done in Piccadilly, and where they had paid £300 in liquidation of any damage they might do to the paving.

Mr. HEILIGHER, in the first place, seconded the motion, but withdrew, on the ground that he did not understand the laying the mains was to be confined to Oxford-street; and the motion was then seconded by Mr. Humphries.

Mr. GEORGE BEACON moved an amendment. He could not, taking the part he had done in favour of the Western Gas Company in favour of competition against monopoly, consent to a motion which only gave the advantages of the Western Gas to Oxford-street, whilst all the rest of the parish were shut out from such advantages. (Hear.) He then referred to previous proceedings on the gas question at great length, and contended, as a matter of justice, and with a desire to get rid of the existing monopoly, nothing short of bringing the Western Gas Company in to light the whole of Marylebone would satisfy him, the gas consumers, or the ratepayers. He then moved an amendment to the effect—

"That it was expedient to allow the Western Gas Company to lay their mains throughout the whole of Marylebone, subject to such penalties and conditions as the present Imperial Gas Company, or upon such terms as might be agreed upon between the vestry and the Western Gaslight Company."

Mr. MILLER seconded the amendment, and said he saw no reason why the inhabitants of Oxford-street should have the privilege of receiving gas at a less price and purer in quality than the other streets of the parish.

Mr. GRANGE would vote for the amendment, but with the promise that the Western Gas Company should be in a position to prove that they were prepared to give a proper security for lighting the parish at large.

Mr. C. ELLIOTT complained that he had, on a former occasion, been

called a friend of monopoly, because he voted against the admission of the Western Company, in the belief that they could not carry out what they promised. His authority on that occasion was Sir James Duke, that it was doubtful they could obtain a sufficient amount of cannel coal to carry out their proposal; or, if they did obtain it, it would be at such a price that it was impossible they could supply gas at the price they stated.

Mr. NICHOLAY considered Sir James Duke a questionable authority, as he was the chairman* of a rival company (the Imperial was referred to), and was interested in keeping out the Western, and maintaining the monopoly of his company.

Mr. VANHEEMS defended the Imperial Company from the imputations cast upon it, and said if it was a monopoly it was a very lenient one, and that it had always been the first company to reduce the price of gas, except on the late occasion. He thought Mr. Beacon, after the statements made on the last occasion, ought to be the last to attack that company.

Considerable further discussion ensued, and Mr. Glasier expressed a desire to withdraw his motion in favour of the amendment, which was ultimately adopted, and, a committee having been appointed to confer with the Western Gas Company on the subject, the vestry separated.

GASFITTERS' MUTUAL ASSOCIATION.

LECTURE ON CANNEL COAL GAS.

JAN. 14.

The committee of this association having requested Mr. Alexander Wright to deliver a lecture on cannel coal gas, the Western Gas Company, in order to give due effect to the lecture by the aid of proper apparatus, placed their board-room at their gasworks, Kensal-green, at the disposal of the association, accompanied by the privilege of allowing the members to view the works. Invitations were issued to a large number of scientific and practical gentlemen interested in the manufacture of gas, and a very large and respectable attendance was the result. Mr. Wright first showed the parties over the works, and explained in an able and interesting manner the progressive operations employed in the production of gas. The company then proceeded to the board-room, and Mr. F. W. Russell, chairman of the board of directors, having taken the chair, Mr. Wright commenced his lecture by expressing the gratification he felt at observing the strong desire manifested by the Gasfitters' Association to obtain information respecting cannel coal gas. He had felt great interest in that association since its commencement, because he was convinced that it was the interest of gas-consumers, gas-manufacturers, and gas-fitters to be united together, study each other's departments, and work into one another's hands. Until the gas-manufacturers and gasfitters understood what kind of commodities they had to deal with, and were prepared to receive suggestions from one another, they could not accommodate themselves to the public desires, and neither party could go on prosperously. He was, therefore, happy to find a union springing up between those parties, from which union he anticipated the best results. Seeing that cannel coal gas was almost a new thing in the metropolis, and but little understood, he had been asked to deliver a lecture on the subject. He admitted that within the last few years the use of cannel coal gas had greatly progressed, and it would be their fault if it did not continue to do so, for he was satisfied that from cannel coal they obtained the greatest quantity of light for the least money; still it was difficult to deal with the many prejudices engrafted on the public mind on this subject. It had been studiously instilled into the public mind that gas was a measurable commodity like water. That was not the case. The specific gravity of water was universally the same—it was a unity; for salt water differed but very little from fresh in its specific gravity. But the difference between the common coal gas and that derived from cannel coal was very great indeed. That was one of the vulgar errors which they had to root out of the public mind. The commissioners of St. James's had within the last few months fully and fairly investigated the matter, and they found cannel coal gas, at 6s. per 1000 feet, to be from forty to fifty per cent. cheaper than the old gas at 5s. per 1000 feet. Since the Western Company applied to lay their mains in St. James's, the opposing companies were obliged to improve the quality of their gas from twenty to thirty per cent. He was glad of this, for he had attached himself to the Western Gas Company from a desire to spread good gas through London. The gas now supplied in many a room in London was so bad that he could not comfortably see to read a newspaper. That was not always so. Formerly Newcastle coal was made to yield good gas, but, strange to say, as improvements increased gas became worse; and as the price of gas was reduced men found their bills increasing; as the quantity of gas became doubled the illuminating power was diminished one-half. (Hear, hear.) As a manufacturer of gas meters he had been accused of making a wrong measure. It was not the measure that was made wrongly, but it was used wrongly. The meters measured *quantity only*, and the public looked to the quantity alone, neglecting the quality, and at last they found themselves paying twice as much when the price was nominally reduced one-half. He was not in the habit of using strong language with respect to other companies, but, now that they were in the habit of putting half cannel coal in their gas, he thought it fair to explain. Before the House of Commons, twelve months ago, it was proved by scientific men that every five cubic feet of their gas was only equal to twelve sperm candles. He would be able to show presently by the photometer, that five cubic feet of the cannel coal gas was equal to thirty candles. If, however, the other companies should raise their gas to sixteen candles, it could not be expected that the Great Western Company could raise its gas to thirty-two. He would now go a little into the natural history of the coal from which this gas was produced. They were all well aware that coal was universally produced from decayed vegetable matter. Geologists were all agreed in this. He had before him some specimens of vegetable matter which time and the rapidity of chemical action, and other circumstances attending their submersion in the bowels of the earth, had converted into coal. One of these was a specimen of brown coal, in which some of the leaves were quite perceptible. This specimen was from the tertiary formation. It was useless for the manufacture of gas, but was employed in France for the manufacture of naphtha. The next specimen was a cannel coal, called "Boghead cannel." It produced a very dull sound when struck. In that respect it very much resembled wood, from which it was little removed; but it yielded 12,000 or 13,000 feet of gas of astonishing illuminating power. It was the most extraordinary specimen of coal with which we were acquainted. The Wigan cannel was almost the opposite extreme of the Boghead cannel. The Wigan cannel was a bright, lustrous, pitchy, and compact mass. Between these were Wemyss, Lesmahago, and Newcastle cannels. He remarked about two years ago that the illuminating power of the gas was in proportion to the dulness of the coal from which it was produced; and he was bold enough to attack the common theory, which was the very opposite. The coals which had the least amount of basis were the brightest.

Mr. Wright invited the audience to inspect a number of specimens which he had arranged on this theory according to their illuminating power. The manufacture of cannel coal gas was similar to that of common coal gas. The coal was first put into retorts about the heat of melting brass. The whole of the vapour was expelled from it, and the pure carbon and earthy matter remained in the retort. The specimen which he held in his hand was nearly pure carbon. It would be easy to conceive that, if that had been deposited in the bed of the river or in estuary, a portion of sand or silex would be washed into it and cause it to have something like its present appearance. In all coke there was some of this earthy matter mixed, and the less of that matter it contained the more excellent in quality was the coke. After the vapour was expelled, ammonia water, tar, and naphtha, were the secondary products arising from the condensation of gas. Sulphuretted hydrogen was then extracted by means of the lime purification, and the process was completed. Gas was valuable in proportion to the weight of carbon contained in it. The Western Company's gas was a little more than half the weight of atmospheric air. It was from ·550 to ·560. It had much olefiant and very little carburetted hydrogen gas in it. The ordinary coal gas possessed little olefiant gas. The specific gravity of ordinary coal gas was about one-third of that of atmospheric air. The Western Company's gas was ·550 as compared with ·400, which represented the ordinary gas; the former gas contained 150 more particles of carbon, which made its illuminating power double. While on this part of the subject he would observe one advantage which gasfitters and the public would derive from the use of the cannel coal gas. If only half the quantity of vapour were required to pass through the meter, then a three-light meter would do as well with cannel coal gas as a five-light meter with any other, and a saving of 15s. would be effected in that matter alone; for if you only wanted, in order to obtain a given amount of light to transmit half the usual quantity of gas, the pipes would be much smaller, and therefore a considerable saving would be effected. Some gentlemen might think that a reduction of price would not be a favourable matter for their profession, but he was persuaded that the more prices were reduced in a fair way, the better it would be for all parties, and ere long he thought gas fittings and everything connected with gas lighting would not come to more than three-fourths of what they cost under the old system. The first outlay on account of gas fittings constituted the great objection on the part of consumers, and, if that could be diminished one-fourth by the introduction of cannel coal gas, a very great impetus would be given to the business of gasfitters. (Cheers.) Besides this, the old gas deposited crystals in the corners of the pipes, but nothing of this kind was found to take place where cannel coal gas was used, for there was an oiliness in it that prevented such a result from taking place. On that account those clumsy, inconvenient, and expensive pipes now employed might be dispensed with, and pipes half the size substituted. He claimed for the cannel coal gas double the illuminating power, and less heat at that power than twice the quantity of the other kind of gas. The cannel coal gas was not so good a heat-producing gas: it was 20 per cent. less in that respect than the other kind of gas, which gave it a decided superiority with regard to the feeling of comfort. For cooking purposes, however, it would be found to have a sufficient heating power, while it had the advantage of being 20 per cent. cheaper, and of effecting a saving of 30 per cent. with a double illuminating power. Although it was a very rich gas, yet when proper burners were used it produced no more soot than gas of the very poorest description. He would now call their attention to the combustion of gas, and the particular circumstances under which combustion was effected. No part of the lecture could be of so much importance to gasfitters as to know the precise steps gone through during the process of combustion, and to know the burners that gave the greatest amount of light, and occasioned the least amount of nuisance. That burner which produces the greatest amount of light was not always the most agreeable, and, therefore, it was sometimes advisable to sacrifice the greatest quantity of light for convenience. Some supposed that when the greatest quantity of light was given the flame was the brightest. That was not always the case, for, of the eight burners of different kinds then in operation, those whose flame was the most dusky in colour gave the most light. The gas coming out of the jet before him was composed of hydrogen and carbon. The first operation that took place was this:—The hydrogen, having a greater affinity for the oxygen of the atmosphere than the carbon, flies out and seizes the oxygen. The bottom of the flame is blue, because there the hydrogen and carbon are combined, and no two gases can produce light. In the inside of the column of flame a series of little balls of carbon or particles of soot (too minute, perhaps, to be seen by the microscope) are passing, the oxygen

* The speaker must have been misinformed on this point, as the worthy baronet is not even a director of the company in question.

attacks them, and, in the instant of combustion, they become red hot, and that causes light. There could be no light without smoke. The ancients had a proverb which implied so much, "Ex fumo dare lucem." If a piece of iron were passed through the lower part of the flame no smoke would be deposited upon it, but if placed at the top it would become smoked at once. 1000 cubic feet of the Great Western Company's gas weighed 42 lbs. 32 lbs. of which were pure carbon and 10 lbs. hydrogen. That gas was given to the public for 6s., and it gave more light by the pound than candles. Having called attention to the effects produced on the surrounding atmosphere by the combustion of gas and the necessity for ventilation, Mr. Wright adverted to the importance of good burners, and concluded by hoping that the gasfitters would feel it to be their interest to recommend to their customers that commodity which was likely to confer on them the greatest advantage. (Cheers.)

Mr. Wright afterwards tested a variety of burners by the photometer; but, the object of the lecturer being to elucidate the manner of making such experiments, he purposely abstained from declaring the results, and therefore no inventor had any reason to go away dissatisfied with his own burner.

The party, consisting of about eighty persons, then sat down to a sumptuous dinner provided for them by the Western Gas Company. The dinner was cooked by gas in a small stove manufactured by Mr. Defries. The simplicity of the contrivance, the smallness of the apparatus, and the immense number of articles which were baked, boiled, roasted, and broiled, in the most perfect manner, in a very short time, and with scarcely any trouble, excited general admiration.

When the cloth was removed, and the usual loyal toasts drunk,

The CHAIRMAN said he had great satisfaction in attending the lecture of Mr. Wright, and was glad that it had been made the means of bringing into immediate communication the different parties interested in the manufacture and distribution of gas. The gasfitters were the only true medium between the gas companies and the public at large; and the more their interests were considered, the more the interests of the public were consulted. It was also impossible that any gas company could be made acquainted with the desires of the public except through the medium of the gasfitters. He would, therefore, give "Prosperity to the Gasfitters' Association."

The toast, having been duly acknowledged, was responded to by Mr. LEIGH.

Mr. DETHRIDGE then gave "Success to the Western Gas Company."

The CHAIRMAN, in responding, observed that, while the light of heaven was taxed, artificial light was not taxed. The several gas companies were, therefore, the more bound to give the public a good article at a small cost. The Western Gas Company was at least conferring one advantage on the public by showing them that they were paying far more for imperfect lighting than what they might procure perfect lighting for. The best artificial lighting in the world, however, would not be available without good gas fitting, and on that ground the Western Company were anxious to cement a union between themselves and the gasfitters. (Cheers.)

After some remarks from Mr. KELLAWAY, a member of the Gasfitters' Association,

Mr. STRODE proposed "The health of Mr. Alexander Wright."

Mr. WRIGHT briefly acknowledged the compliment.

The next toasts were "The Paving Board of St. James's" and "Mr. Dethridge, Chairman of the Gasfitters' Association;" after which the company separated.

PROPOSED EXHIBITION OF GAS APPARATUS.

JAN. 15.

A general meeting of the association was this day held at the Gerard's-hall, Basing-lane, for the purpose of making arrangements for a great exhibition of every description of gas apparatus at the forthcoming Exposition of the Industry of All Nations. As the Royal Commission prohibited any kind of apparatus exhibited in the Crystal Palace being in practical operation through the agency of gas, the Gasfitters' Association felt it necessary to have a separate exhibition of their own, and that it should commence and determine on the same days as the Great Exhibition of the Industry of All Nations. The movement was originated in November last by Mr. L. Harold Leigh, and a committee appointed at a public meeting to carry the project into effect. The several gas companies were then written to, requesting their co-operation, and their answers were expected on this occasion.

Mr. DETHRIDGE, who presided, informed the meeting that on the previous week letters had been addressed to all the gas companies, but, as some of them had not had board meetings since, only a few answers had been received. The first was from the *Imperial*, who expressed their approval of the project, but did not think the provisions of their act of parliament would allow any interference on their part. If, however, other companies assisted, the directors of the *Imperial* would consider any proposition whereby they might add to the efficiency of the exhibition. The meaning of the document was, "if you are successful, we will assist you; the Imperial will fall in with the mob." (Laughter.) A letter was also received from Mr. S. Andrews, secretary of the *Equitable*, stating that they would cheerfully contribute towards the expenses. (Cheers.) The directors of the *Chartered* Gas Company also promised their support, and an official communication on the subject was to have been sent that day to the meeting.

Mr. BARBER, secretary of the Great Western Gas Company, said he had no doubt that company would also approve of and support the project.

The letter of the *Imperial* was severely commented upon by several members, but defended by Mr. DEFRIES, who attributed it to caution rather than unwillingness to contribute towards the exhibition.

Mr. DETHRIDGE then moved—"That it is expedient to take measures to actively carry forward the exhibition of gas apparatus as proposed by the Gasfitters Association, and that subscriptions for that purpose be received by the treasurer." He thought it would be necessary to prepare an address to the provincial gas companies. As this was a national affair they would be expected to contribute, though not in so large a proportion as the metropolitan companies.

Mr. VERITY seconded the motion, and it was agreed to.

On the motion of Mr. GALE, seconded by Mr. DEFRIES, Dr. Bachhoffener was elected a member of the committee.

Mr. DEFRIES moved that the following gentlemen, with the secretary (Mr. Leigh), constitute a committee to further the business:—Mr. Kitchen, Mr. Defries, Mr. Verity, Mr. Dethridge, Mr. Gale, and Mr. Pearse, and that this meeting do now adjourn till Wednesday, the 22nd inst., at seven o'clock, when the sub-committee shall report progress.

Mr. HULETT seconded the motion, and it was carried *nem. con.*

The meeting then adjourned.

JANUARY 22.

The adjourned general meeting of the association took place at the Gerard's-hall to-day, Mr. Dethridge in the chair.

A letter was read from the secretary of the *Western Gas Company*, stating that the directors would cheerfully assist in promoting the object which the association had in view, and suggesting that all the gas companies should contribute towards the expenses, in order to render the exhibition thoroughly attractive; also a letter from the secretary of the *South Metropolitan Company*, stating tha the would bring the circular of the association under the consideration of the board at their next meeting; also a communication from the *Chartered Gas Company*, expressing their approval of the proposed exhibition, and stating that the directors had voted the sum of £50 towards the expenses, which sum would be paid immediately; also a letter from the *City Gas Company*, simply acknowledging the receipt of the circular of the sssociation, and declining to appoint any delegate to the meeting.

The CHAIRMAN said he was certain that the last-mentioned company would give their support, but they were rather cautious at present. The *Commercial*, the *Phœnix*, the *London*, and some ten other companies had not replied yet. From all the letters received it appeared that the companies did not like to interfere in carrying out the exhibition. They considered, and he fully agreed with them, that it would be much better to leave it entirely in the hands of the gasfitters themselves.

Mr. ANDREWS, secretary of the *Equitable*, stated that he did not appear officially on the part of that company, but he believed the board had no objection to support the project, although they did not wish to interfere themselves.

The CHAIRMAN informed the meeting that on Monday last himself and Mr. Gale had had a conversation with Dr. Bachhoffner and the secretary of the Polytechnic Institution, who stated that several apartments in that institution would be placed at the disposal of the Gasfitters' Association to enable them to carry out the intended exhibition. Some outlay would be required in preparing those apartments for the exhibition, but the expense of servants would be borne by the institution.

Mr. KITCHIN then moved—"That the sub-committee having reported to the association that the directors of the Royal Polytechnic Institution would place at the disposal of the association sufficient space to carry out the intended exhibition of gas apparatus in connection with the association, the sub-committee be empowered to make such arrangements with the directors of the Polytechnic Institution as may be necessary to carry out the exhibition at that place, and that they also consider and report on what steps it may be desirable to take to raise subscriptions to carry forward the project."

Mr. DEFRIES seconded the motion, and it was carried unanimously.

On the motion of Mr. KITCHIN, Mr. Andrews was unanimously elected as a member of the committee.

The meeting then adjourned till Tuesday, the 28th of January.

DR. BACHHOFFNER'S LECTURE ON THE ELECTRIC LIGHT.

JAN. 25.

This evening Dr. Bachhoffner addressed a numerous body of the Gasfitters' Mutual Association, at the lecture theatre of the Polytechnic Institution, on the subject of electricity, with especial reference to its adaptation to lighting purposes. Previous to the lecture the theatre was brilliantly illuminated by the electric light, which was continued for upwards of ten minutes. The flame did not appear to be half an inch in diameter, but such was the intensity of its light that twelve gaslamps were almost completely eclipsed, and heated air, which, previously, was invisible, was made to throw dark moving shadows on the opposite walls.

The lecturer, who was much applauded on his entrance into the theatre, addressed the assembly nearly as follows:—

I have much pleasure in meeting you on the present occasion. It is more than possible that we have with us to-night many who are not members of the association to which we belong, which association has met here to-night by invitation. I allude to the association recently formed called the Gasfitters' Mutual Association. This is a society which, I believe, will be productive of a vast amount of benefit to the community at large. I am aware that combinations are generally repudiated, and properly so when they are not made for legitimate purposes. In the present case no such charge can be placed to the account of the Gasfitters' Association. This association is not altogether confined to mere artisans, but numbers among its members those who are anxious for the introduction and improvement of that main ingredient in domestic comfort—artificial illumination. The time has arrived when, if individuals wish to compete with their fellow-men, ignorance will not serve their purpose: they must qualify themselves by being educated in every department of their respective occupations. Meetings like the present, where in the multitude of counsellors there is wisdom, are highly calculated to promote that desirable end, and I hope that those who have met here to-night will find that their time has not been altogether thrown

away. (Hear, hear.) The subject of the electric light is not foreign to this association. But some may ask, "If this light succeeds what will become of the gasfitters? our occupation, like Othello's, will then begone." Now, it strikes me that, if the electric light became common, the business of gasfitters would still be as essential as it is at present, and therefore it is imperatively necessary that they should understand the nature of that light which they may soon be called upon to supply. (Hear, hear.) The electric light, of which we have now a specimen before us, stands exactly in the position in which the gaslight did in the time of Winsor. I dare say our friends recollect the opposition offered to the introduction of gas in those days. People then said with reference to the general use of gas, "Nonsense! ridiculous! it is all stuff! such a thing never can be!" In all projects of this kind there is one mode of investigation which should be always adopted; we should first endeavour to ascertain if the projected scheme be in accordance with nature's laws, and, if so, depend upon it that perseverance, industry, and science will overcome every difficulty. (Cheers.) I believe the electric light is in accordance with nature's laws, but I also admit that at present some few difficulties present themselves in the way of its practical application. In all probability these will soon be overcome. In commencing this subject we may first ask what is electricity? and here echo answers, "What?" and I know not how to answer the question in any other way. Many have an idea that the electric fluid is well understood; but in truth we really do not know what electricity is; so far from its being generally regarded as a fluid, many believe it to be a mere property of matter. Allow me here to call your attention to the sources of electricity, which are very numerous. They are friction, magnetism, chemical action, vitality, and heat. The imponderable agents are heat, light, electricity, gravitation, attraction of cohesion, magnetism, and chemical action. These are constantly in operation. They are invisible. We do not know what they are, but they are forces constantly operating, and producing certain effects. Certain expressions for the purpose of conversing about them have been adopted, and, therefore, we set out by supposing that there is such a thing as an electric fluid. Many are not aware how easily this fluid is brought into a state of activity. We have instruments which detect minute quantities of electricity which ordinarily would escape observation.

As illustrative of this the learned gentleman placed a pendulum in a glass jar; from the lower end of the pendulum two leaves of gold were suspended. Having passed a piece of brown paper rapidly through his hands, and placed it immediately over the pendulum, the gold leaves instantly diverged several inches at their base. This showed the large amount of electrical force disturbed by friction. By passing the brown paper through a piece of woollen cloth the same effect was produced.

According to the views commonly entertained by scientific men in this country, it is supposed that everything in nature has a portion of the electric fluid locked up in it. That view was entertained by Franklin; but on the Continent they have a double-fluid theory. The one is exhibited by glass, and called vitreous; the other by resin, and called the resinous. Now, it is impossible to produce the vitreous without at the same time exciting the resinous electricity. If you take a piece of resin or sealing-wax, you will find that each has its electrical action on the gold leaves in the jar [this the lecturer showed]; but if you bring them together you will find that, instead of increasing the amount of electrical action, they will neutralize each other; there will be no divergence of the leaves in the jar. We cannot produce one kind of electricity without exciting the other. It is impossible to bring any two bodies into contact with each other without disturbing electricity. If I rub two pieces of paper with indiarubber they will produce electrical action, and I could show that even the stool on which they are rubbed is electrified. I now come to that part of the subject with which we have to deal to-night. [The lecturer, having placed a voltaic battery on the table, proceeded.] I have here a rod of zinc and a rod of copper. I immerse them in a mixture of oil of vitriol (sulphuric acid) and water; while separate they will remain in a neutral state, but the moment I bring them into contact you will see a marked effect. The whole vessel containing the water will have the appearance of boiling. Separate the copper and zinc rods, and everything will return to a quiescent state. It is a marvellous fact that so simple an experiment should have so long escaped observation, for it was an unknown effect until the time of Volta, in 1799. He constructed the galvanic battery, which was so called after Galvani, but most people call it voltaic, after Volta, because Galvani did so little, and Volta so much. Water is composed of hydrogen and oxygen, the proportions being in weight as one of the former to eight of the latter. These are said to have a chemical affinity for one another, which causes them to unite and produce water. If you ask a chemist what he means by chemical affinity, he will tell you it is a disposition which bodies have to combine with each other. And if you press him still closer, and ask what he means by the disposition which bodies have to unite with one another, he will tell you that that is chemical affinity. (Laughter). If a piece of iron were put into sulphate of copper, it would come out coated with copper, and, for every 32 lbs. of copper deposited, 28 lbs. of iron would be deposited on the copper. [The lecturer then held a glass vessel in his hand having a piece of bladder strained over it. Into this vessel he put another containing some oil of vitriol and water. The outside vessel he filled with sulphate of copper. Neither of the fluids had any communication with each other. He then placed a piece of platina in the sulphate of copper, and a piece of zinc in the oil of vitriol. When these were brought into contact by a conducting wire electrical action took place, and in the course of a few seconds the platina, which, before contact with the zinc, could not decompose the solution, was found covered with metallic copper.] This beautiful effect (continued the lecturer) was called the electrotype, and was but a recent discovery. It was strange that such a curious fact should have been at our fingers' ends for forty or fifty years without scientific men knowing how to apply it. It was reserved for Mr. Spence, of Liverpool, an amateur, not a scientific man by profession, to apply that principle to purposes of ornament and utility. I stated that water consisted of one part of hydrogen and eight parts of oxygen. These are the least proportions in which these two will unite, and eight is called the atomic weight of oxygen, and one the atomic weight of hydrogen, giving nine for water. The amount of electricity set free in the decomposition of water is equal to the quantity decomposed. The lecturer, having described by diagrams (which we are unable to furnish) the process by which decomposition was effected, remarked that if a wire connected with a battery of sufficient power was put into the water at London-bridge, and another at Calais harbour, the moment the electric fluid passed it would decompose the water between those two places. Water was decomposed in volumes of two measures of hydrogen to one of oxygen, the weight of hydrogen compared with the oxygen being as one to eight. Many persons made serious mistakes as to how the electricity was to be obtained: some said there was plenty of it in the atmosphere, and others in the earth. The difficulty, however, was how to get at it. There was a difference between frictional electricity and voltaic electricity. Gun cotton might be so manufactured as instantly to go off in a puff of flame, like a discharge from a leyden jar; while galvanic or voltaic electricity quietly stole along through a line of conducting matter. He would not detain the meeting by referring particularly to the different forms of the galvanic battery. He would caution the audience, however, against falling into the popular error of getting a cheaper battery. To suppose that we might have a larger battery of lower intensity, but capable of eliminating from its size the quantity of electricity with a less amount of chemical action we required, was a great mistake. Dr. Faraday had shown that, for the quantity of electricity set free, there must be an equivalent amount of chemical action, and whether that resulted at once, or was slowly meted out, amounted to the same thing. For every atom of zinc dissolved there would be an atom of water decomposed. Dr. Bachhoffner here called attention to an old-fashioned and obsolete battery of copper and zinc, and also to Cruikshank's and Wollaston's batteries, and observed that the disadvantage connected with the old one was, that when it was not in use the acids were dissolving the metals, whereas the chemical action could be stopped in Wollaston's when it was not in use. The next improvement in the galvanic battery was that of Professor Daniel, of King's College, and it was his (Dr. Bachhoffner's) opinion that, if the electric light should ever succeed, this was the battery that must be employed, and for reasons which he would presently explain. The battery was similar in its arrangement to that of the one with which he had made the experiments with zinc and copper and sulphate of copper. In a cylinder of copper containing sulphate of copper an ox-gullet containing sulphuric acid and water was inserted, and contact was formed by a rod of zinc inserted in the one and of copper in the other, as was shown in some of the foregoing experiments. The battery which he (Dr. Bachhoffner) used was one invented by Professor Grove, in which a series of glass cells, zinc plates, platina and porous tubes, filled with strong aquafortis, were bound together in a frame. The battery consisted of forty of those, and the platina alone cost £35. His friend Dr. O'Shaughnessy, of India, constructed a battery of this kind; but, as he could not procure platina, the gold or rupees cost him £500. It was doubtful whether rupees or sovereigns were sufficiently plentiful in London for persons to apply them to such a purpose. (Laughter.) The metallic bodies were conductors of electricity, but they were not all so to the same extent. Silver was the best metallic conductor of electricity. This was an important fact to know; because, if called upon to construct a line for the conveyance of electricity, and an iron line were employed, the size of that line would require to be very much increased, for otherwise, being a worse conductor, it would not convey the electricity in the same amount. In reference to heat, the conducting power of metals was in this order—silver, gold, tin, copper, platina, &c. The voltaic series by acids was in this order—potassium, zinc, cadmium, tin, iron, bismuth, antimony, lead, copper, silver, palladium, tellurium, gold, charcoal, platinum, iridium, rhodium. He would next speak of what were called the calorific powers. Most of those who turned their attention to electricity found that it was capable of devolving the peculiar force called magnetism. If a current of electricity were transmitted lengthwise through a bar of iron it would produce no sensible effect upon it; but if sent round it in coils the iron would be immediately converted into a magnet. [A small bar of iron thus electricized exhibited great magnetic power, and was declared by the lecturer to de capable of resisting a force of ten tons. As soon as the electricity was removed the magnetic power disappeared.] There was a popular error with respect to the conveying of the electric current by wires, which he wished to remove. About nine or ten years ago, when lecturing on electric clocks and telegraphs, he threw out the hint that eventually wires would be laid down in the streets of the metropolis, and brought into our houses for domestic purposes. A gentleman who heard him came to him and said, "Of course that was a joke of yours altogether. What!" said he, "you would not think of laying down wires in the streets?" On being told by the lecturer that it was no joke, that he believed it practicable, "Ridiculous!" said the other; "who would venture to walk along the streets? Why, the passengers would be all electrified!" This idea was altogether erroneous. He (Dr. Bachhoffner) could introduce the wires of the battery into his mouth [and did so] without experiencing any further inconvenience than what would arise from the taste of so much copper under ordinary circumstances. They had all, no doubt, heard the common rumour that the wires of the electric telegraph had been converted into game-catchers; that when the birds touched them they tumbled down dead, and the people had nothing to do but pick them up. The quantity of electric fluid passing through the wires which he had placed in his mouth was ten thousand times as great as that which passed through the telegraphic wires, yet he received no injury. The fact was, that the birds sometimes went to roost on the adjacent trees, and it was probable that

those who were found dead under the wires were killed by accidentally flying against them. He would now approach the most important part of the subject. It was evident that the electricity now passing through the wire attached to the battery was not developing heat. It would be found, however, that, by diminishing the amount of conducting surface in any part of the line below the point of contact, the heat would be immediately eliminated, because then the diminished surface of the wire would not be sufficient to transmit the amount of electric force. [In illustration of this the lecturer made a piece of fine wire a part of the circuit, and the result was that it immediately ignited and was consumed like so much woollen thread.] This he believed was the cause operating in the production of the electric light, and he would proceed to show how far this was borne out by facts. [By bringing two pieces of copper into contact, and afterwards barely separating them, a brilliant star of light was the result. The same experiment was repeated, iron being substituted, and a beautiful light was also produced. Zinc was next employed. It produced a blue light, and the reflective light, as thrown on the lecturer's hand, was a beautiful pink. These experiments were designed to show that the light resulted from the force of the electric current, and that the colour of the light was the effect of the metal employed. Two pieces of carbon were next employed, and they produced what is now popularly known as the electric light. When a reflector was placed behind this, its direct rays were far too powerful for the human vision. The lecturer here reminded the auditory that this was no new discovery. He had seen the electric light thirty-two years ago, when at school. About that time he attended a course of lectures on chemistry given by a Mr. Webster. The words carbon, hydrogen, and oxygen, then haunted his imagination, and he never afterwards could get those three terms out of his mind. He believed the light was about forty-five years old, but it was impossible to say who discovered it. No light so powerful as the one exhibited in that institution (the Polytechnic) had been produced until Sir Humphry Davy exhibited it with a galvanic battery of 2000 plates, the most powerful ever brought into action. When the two pieces of carbon were brought into contact, it was found that one was gradually increasing and the other gradually diminishing in size. It was quite evident that the carbon was passing from one side to the other, the carbon at one side becoming concave, and the carbon at the other side convex, in their respective extremities. The particles in their passage became incandescent, and this incandescence was the cause of the light produced. As far as he knew, carbon was the only material that could be employed, as all the metals gave coloured flames. Carbon also had this recommendation, that it was readily obtained. The carbon found to answer was that peculiar deposit lining the interior of coal-gas retorts. Sometimes this was deposited in large quantities, and was of no use. Any one intimate with a person connected with gas works could get a barrowful of it without any expense. He held in his hand a piece of this carbon. It was very similar to plumbago, or blacklead; owing, however, to its atomic arrangement it would hardly make a mark upon paper; but, after being operated upon by electricity, it became converted into the most beautiful black lead. Having demonstrated this by an experiment, Dr. Bachhoffner observed that, if the supply from our lead-mines ever fell short, we should be able to make blacklead out of this waste material. He was not even sure if it would not prove a profitable investment of time and capital to convert this material into blacklead at present. By doing so we should strike at the root of a serious monopoly, for the proprietors of the lead-mines, by only doling out a small quantity at a time, were enabled to charge whatever price they thought proper. The learned gentleman next referred to Allman's invention for the production of voltaic light. By transmitting the electric current through a coiled wire, so as to make the fluid circulate round a magnet, it was found that while the wires were in contact the needle would be deflected, and the definite position of the magnetic needle would form the measure of the amount of force in circulation. As the quantity of electric force diminished the angle would diminish; take the wires away, and the needle would return to its original position. By this arrangement the electric current itself causes one of the pieces of carbon to move with the magnet to which it is attached, and a continuous light is produced. The whole machinery employed is the deflecting power of a magnetic current upon the needle. (The experiment illustrative of Mr. Allman's invention elicited loud plaudits.)

This invention (continued the lecturer) was a parallel to that of Watt. After he had completed nearly all his splendid discoveries in reference to the improvement of the steam-engine, he was met by a friend who, instead of complimenting him for what he had already done, found fault with him for not doing more. His friend said, "You have created a monster, but, like another Frankenstein, you are unable to control it." Watt said, "It is quite true, but I shall never rest satisfied until I make my monster govern itself." Now, as steam has been made its own governor, so has the electric light. Mr. Allman has certainly succeeded in that. The invention has been materially altered during the last eighteen months. When I last took up the subject there were two difficulties in the way. The one was the want of continuity. I do not call the flickering of the light the want of continuity. The want of continuity is this, you may adjust the points of the carbon, and get a beautiful light, but prior to Mr. Allman's invention we could not get a continuous light for ten seconds. Now, Mr. Allman makes the electricity regulate and adjust the points of the carbon, and therefore the light is constant. The flickering is a minor difficulty, and I believe the time will yet come when the electric light will be generally employed. The next difficulty is to be found in three letters of the alphabet. These three are undoubtedly L. S. D. (Laughter.) As it is necessary that I should say something to you about what this light will cost, I shall take the liberty of reading a few extracts from the statements made by the patentee:—"Coal gas," he says (and of course he is going to show that the electric light is preferable—that there is nothing like leather); "coal gas as a manufacture has now arrived at its mature state. Millions have been expended to perfect it. Talent, labour, money, and competition have done all that could be done to render it useful, cheap, and elegant in use. Now, assuming the price to be, say 4s. per 1000 feet, we will examine what chance voltaic electricity has of successfully competing with it on the score of economy. The present state of the manufacture of electricity may be compared to the time when coal gas was made for the lecture-table, before a pound was expended in its manufacture, and before it was ever determined or thought possible to apply it to useful or commercial purposes; in fine, before the want created the manufacture, and brought it to maturity by the expenditure of money, science, labour, and experience, employed during a series of years. Electricity is at present produced from lecture-table apparatus, and without the benefit or the advantages which have brought gas to its present state of perfection; yet electricity, under all these disadvantages, if produced from one of the present lecture-table apparatus, and one of the dearest in use, will produce a more light-giving agent for 8s. than eight shillings' worth of coal gas at 4s. per 1000 cubic feet." That is not my statement. Perhaps you would wish to have my opinion. I regret to say I am not in a position to offer an opinion. Here is a statement made by the patentee, and I think a man would hardly be so unguarded as to throw out a statement of this sort without sufficient data. Now, I have no data to go upon. I am not able at present to test the value of the light photometrically, or the cost of the material in the battery. I must, however, candidly admit that I believe the cost of the electric light has been by the inventor a little underrated. But there are times and occasions when if it cost ten times the amount of gas it would be preferable. I do not think that the gas will be put out by the electric light; far from it. I think there is a fair opportunity for the electric light to be made available. It has one useful property—it does not depend upon the atmosphere as a supporter of combustion. If the electric light is placed in a position where the air can neither get in nor out, it shines as brilliantly as if in the open air. It will shine, and continue to shine, for hours together in a little globe two inches in diameter hermetically sealed. That circumstance proves that this light does not depend upon the atmosphere as a supporter of combustion, and, consequently, that it cannot interfere with the health of the individual. Much may be said about the unpleasantness of gas, particularly when it is not well purified. But all gas is tolerably well purified now. We have not much to find fault with in that respect. (Laughter.) But, let it be ever so pure, there are two products—water and carbonic acid gas—which are generated in every situation and under every circumstance in which coal gas is *burned*. These products ought to be got rid of—the water as well as the carbonic acid gas. In a room where gas is burned you can easily tell how often the windows are cleaned. The glass becoming dimmed with the water catches the dust, and requires cleaning twice or thrice a week. It would be well if gasfitters could turn their attention to some easy mode by which the products of combustion could be carried off. Architects often build houses without ever thinking of ventilation. When you put up gas fittings you should deem it as necessary to put up a chimney to that gas as an architect would to construct an ordinary fireplace. (Cheers). I am sure, in conclusion, that if I have not exhausted the subject I have exhausted your patience. My object was, in bringing before you a few facts, to merely touch on the heads of subjects; and if I have given you any instruction I am sure I am much gratified. (Cheers).

Mr. DETHRIDGE, president of the Gasfitters' Mutual Association, moved a vote of thanks to Dr. Bachhoffner for his very able lecture. He possessed the happy knack of communicating a great deal of instruction in a most agreeable manner. (Cheers.) In the next place, the thanks of the association were due to the directors of the Polytechnic for placing their commodious theatre, the only night on which it was disengaged, at the disposal of the gasfitters. They had also to thank Dr. Bachhoffner and the directors for the warm manner in which they had taken up the subject of the forthcoming exhibition of gas apparatus in operation, and for affording accommodation for that purpose in the Polytechnic Institution.

The motion was carried by acclamation, and the proceedings terminated.

POPULAR LECTURES ON CHEMISTRY,

By H. WYATT, Esq., B.A.

CARBON.

Carbon presents the most varied aspects. It is found in nature quite pure, and is then crystallized,—this is the diamond. This gem is found in alluvial soils, resulting from the destruction of ancient rocks, whose débris has been transported by water. The principal diamond works are situated in the East Indies, the isle of Borneo, and Brazil. Diamonds are very rare, even in this débritus, and to find them it is necessary to wash great masses of sand with minute care. The diamond, in its natural state, is ordinarily rugous at its surface, and slightly translucent. Sometimes its crystalline form is very distinctly defined. The crystalline surfaces of the diamond are rarely plane, but are generally more or less convex,—the borders are, therefore, somewhat curved. The diamond is generally colourless, but sometimes it is shaded with different tints. The commonest colours are yellow and brown; blues, roses, and greens are, however, sometimes met with. The density of the diamond varies from 3·50 to 3·55.

The diamond is the hardest body known, and is capable of scratching all without exception. The natural facets of the gem are harder than those which have been cut; this is the general property of minerals. The diamond can only be cut by means of its own dust. The process of reduction is commenced by rubbing two diamonds against each other; a fine powder is detached, which is collected with great care; the diamond thus acquires the first outline of the form it is to take. To perfect the form required, and give the gem its requisite polish, it is fixed in a revolving platform, and ground with a mixture of olive

oil and its own dust. The inferior and unmarketable diamonds are ground, and their dust is used to polish the rarer qualities.

The diamond being of pure crystallized carbon, many attempts have been made to crystallize carbon by artificial means, in the hope of obtaining the diamond, but these attempts have hitherto remained unfruitful. Carbon is completely infusible at the highest temperatures which we can produce in our furnaces, so that we cannot hope to crystallize it by way of fusion; on the other hand, we know of no solvent of this body, and are, therefore, unable to crystallize it by solution. Cast iron, indeed, when it is liquid at a very high temperature, will dissolve a greater portion of carbon than it can retain when its temperature is lower, so that on cooling it abandons a portion of carbon during the process, which takes the crystalline form. But this substance is found in brilliant dark laminæ, which offer no resemblance to the diamond.

The diamond placed between the two charcoal cones of a strong pile rises to a very high temperature; it becomes so incandescent that the eye cannot support its brightness. But, if we observe this phenomenon through a darkened glass, we shall see that it swells considerably, and divides into several fragments. After cooling, the aspect of the substance is found to have completely changed; it has become of a metallic grey colour, is friable, and resembles, in every respect, the coke of a smithy. This fact seems to prove that a high temperature is not favourable to the existence of carbon in the state of the diamond, and it becomes probable that the formation of that substance has not taken place under the agency of excessive heat.

Nature has also presented carbon to us in another crystalline state, very different from that of the diamond, and under the form of very small spangles, of a metallic grey colour. These spangles are aggregated together and form brilliant masses, which are easily cut with a knife, and which leave grey traces on paper. This is the matter known in the arts as plumbago.

Organic bodies are compounds of carbon, hydrogen, oxygen, and sometimes nitrogen. When these bodies are submitted to a high temperature, hydrogen, oxygen, nitrogen, and a portion of carbon are disengaged in the state of volatile combinations, and a portion of carbon remains as residue. This carbon presents three different aspects, according to the nature of the organic matter. Thus, if we calcine a piece of wood, the residuary charcoal is black, and its broken surface presents the structure of the wood from which it has been produced. If we calcine sugar, or an animal substance, a black, brilliant puffy substance, of small specific gravity, and presenting the appearance of a fused mass, is left behind. But it is not the charcoal in a melted state, it is the organic matter which has begun to melt under the first influence of heat, and which has become more paste-like as the decomposition proceeded; and it is swelled and puffy, because it has been traversed continuously by disengaging gases.

Coal calcined in close vessels gives a charcoal which we call coke, and which presents very different aspects, according to the quality of the coal. Bituminous coals begin to melt before they are decomposed, and give a charcoal of a brilliant metallic grey. The anthracites, which lose only a small portion of their weight in calcination, give a charcoal or coke which presents the form, and often the aspect, of the portion of anthracite from which it has been formed.

Certain organic matters, on burning in the air, experience only an incomplete combustion. They burn with a sooty flame, which deposits carbon under the form of a black and extremely fine powder, called lampblack.

Carbon in these diverse states presents very different physical properties; its density varies within very wide limits. The density of the diamond is 3·50, that of graphite 2·20, and that of pulverized coke ranges from 1·60 to 2·00.

Wood charcoal presents very variable densities, according to its porosity. At first sight it appears to be lighter than water, for it floats on the surface of that liquid, but it is easy to demonstrate that it only does so because the charcoal is full of interstices, into which water cannot penetrate. When powdered it sinks at once to the bottom of water.

Carbon is ordinarily a bad conductor of heat; a piece of charcoal may be lighted at one end, and held in the fingers very near the incandescent part, and yet no notable sensation of heat be experienced. Common wood charcoal is also a bad conductor of electricity; on the other hand, when it has been submitted to strong calcination, it becomes a good electrical conductor.

The varieties of porous charcoals present remarkable absorptive properties, of which extensive use is made in the arts. Charcoal absorbs colouring matter held in solution in water. If we agitate red wine for some minutes with certain porous charcoals, in a powdered state, it will completely lose its colour, and pass out of the filter transparent. Charcoal absorbs many odorous matters in like manner. Stagnant water is often purified by this means. It is on account of this property that vessels intended for the reception and preservation of water are usually charred on their inner surfaces.

The absorptive powers of charcoal differ very widely in different varieties of the substance. Graphite and coke are totally destitute of them; but in wood charcoal they are very energetic, and in proportion as the pores of the substance are numerous. It is, however, animal charcoal, that resulting from the calcination of bones in close vessels, which possesses absorptive power in the highest degree. Bones are usually calcined for this purpose in large iron cylinders, placed horizontally in a furnace; from one extremity of each of these cylinders a pipe conducts to a refrigerant apparatus, in which ammoniacal products condense. When calcination is complete, the charcoal is withdrawn, extinguished in an etouffoir, and afterwards reduced to powder by grinding.

Carbon burned in the air changes to a gas, which is carbonic acid. Its combustion in oxygen is more vivid. A piece of charcoal is fixed to the end of a wire, and lighted at the flame of a spirit-lamp, and plunged quickly into a flask of oxygen, when it burns with great brilliancy. It is easy to perceive that an acid gas is formed in combustion; if we pour in a small quantity of blue litmus dye it becomes red; if we pour in lime-water, this at once becomes milky, and carbonate of lime is precipitated. The different charcoals are variously combustible, this property being inversely as their density,—thus, wood charcoal burns in air; compact coke, that of anthracite, will not burn except with a strong draught. Graphite and the diamond, heated to incandescence, will not burn in air, but combustion goes on in oxygen.

Carbon has a very great affinity for oxygen; it is moreover completely fixed—properties which make it a valuable agent for reducing other substances by carrying off their oxygen. It is employed almost exclusively in the metallurgic arts to reduce metallic oxides.

Carbon forms several combinations with oxygen; we shall consider the three of greatest importance. They are carbonic acid, CO^2; carbonic oxide, CO; and oxalic acid, $C^2 O^3$. The two first are gaseous at ordinary temperatures, the third has not hitherto yet been isolated. It is only known in combination with water of the bases.

Carbonic Acid.—When carbon is burned freely in air or in oxygen, it is changed into carbonic acid; but the most simple process for obtaining carbonic acid gas, and in quantities which may be increased at pleasure, consists in acting upon carbonate of lime, a substance very abundant in nature, by a strong acid. Our ordinary calcareous stones, marble, chalk, and the shells of certain fish, are essentially formed of carbonate of lime; statuary marble is a very pure carbonate of lime.

To prepare carbonic acid, we place fragments of marble in a flask, pour down upon it, through a vertical pipe, a certain quantity of water, and agitate the flask for a few moments, in order to drive off, by water, the air bubbles which adhere to the fragments of marble. An abducting tube is adapted to an orifice in the side of the flask, which conducts to the receiver of the gas. Hydrochloric acid is then poured in, by means of the vertical tube, which leads to the bottom of the flask. Directly the acid comes into contact with the marble, a very active effervescence is set up, produced by the engagement of carbonic acid gas. The reaction is represented in the following equation:—

$$Ca\,O\,CO^2 + H\,Cl = Ca\,Cl + HO + CO^2.$$

Thus we see formed carbonic acid, under the form of gas, which may be collected over water or mercury, chloride of calcium, which is dissolved in the water of the flask, and lastly, water, which mingles with that originally contained in the flask. It is necessary to allow a considerable quantity of carbonic acid gas to escape before collecting it, if a pure gas is required, as the gas has to drive off the air contained in the upper part of the apparatus, and also that which is lodged in the interstices of the marble. Carbonic acid gas is pure when it is completely absorbed by a solution of potash. Hydrochloric acid is added, through the funnel, in very small quantities, and only as the effervescence produced by the addition previously made subsides. Hydrochloric acid may be replaced by sulphuric acid in this experiment. The reaction is then represented by the following formula:—

$$Ca\,O\,CO^2 + SO^3 = CO^2 + Ca\,O\,SO^3.$$

In this case carbonic acid and sulphate of lime are formed. The sulphate of lime is very insoluble in water, so that the greater part is deposited in small crystalline lamels, which hinder the action of the sulphuric acid on the marble, and render the reaction difficult. This inconvenience is not encountered when hydrochloric acid is used, because chloride of lime is very soluble in water, and consequently leaves the fragments of marble freely exposed to the action of the acid liquid.

Carbonic acid is a colourless gas, with a rather pungent sub-acid smell, and a slight acidulous taste. Its density is greater than that of air, on which account it may be collected by displacement. Carbonic acid gas is liquefied by a pressure of thirty-six atmospheres. This is best accomplished by condensing the gas, by means of a pump, into a strong copper vessel, such as is used for air-guns. The liquid carbonic acid, by its almost instantaneous evaporation, when allowed to escape through a jet, produces so much cold as to freeze a part of the gas into a white solid like snow. The solid carbonic acid evaporates slowly, but, if mixed with ether, more rapidly, so as to freeze mercury easily. The liquid acid expands by heat in a greater degree than even the gas does.

Carbonic acid gas is absorbed by water, particularly under increased pressure, and gives to that liquid an acidulous taste, and the power of reddening litmus, although on exposure to the air, or on boiling, the gas is given off, and the blue colur is restored. Carbonic acid extinguishes bodies in combustion; a lighted taper plunged into this gas immediately goes out. It does not support respiration; an animal plunged into this gas perishes instantly from asphyxia. Carbonic acid does not, however, exercise any deleterious influence on the organs, for it may exist in large proportions in the air, without seriously inconveniencing the respirer, provided there be a sufficient amount of oxygen present to support respiration.

CITY OF LONDON COURT OF SEWERS.

A court of the members of the above-named commission was held at the Guildhall on the 28th ult. Mr. Deputy Peacock presided.

The minutes of the former meeting, having been read by Mr. Tickner, the assistant clerk, were allowed to have been correctly entered.

DISTURBANCE OF THE PAVEMENTS BY THE GAS COMPANIES.

Mr. H. L. Taylor said he had lately had sent to him—and he presumed every member of the commission had had likewise—a printed paper containing the estimated amount of the assets and liabilities for the present year on the consolidated and sewers accounts; the object of which estimates is to enable members to form some opinion and judgment as to the amount of the rates required to be made. (Hear.) The second item in the consolidated account he confessed astounded, and yet did not surprise, him, when he remembered what was foretold, something like twelve months ago, as to what would be the result of that court giving permission to the Great Central Gas Company to open the pavements of the city. The sequel of that act was now apparent, and in round numbers was exhibited on that paper at the

enormous sum of £20,000. (Cries of "No, no;" and "Hear, hear.") Yes, he repeated, £20,000 they had now to pay for their folly. (Interruption.) Yes, £20,000 to replace the pavements in their former state after having been disturbed by the Great Central Gas Company. (Hear.) Now, he hoped that his friends, who had been so sanguine that the new company were going to offer such benefits to their fellow-citizens, would remember that £20,000, and no less, was required to restore the pavements to their original condition. (Hear.) Now, he wished to know whether this was not a matter of deep concern to the members of that commission, and whether they ought not, in strict justice to the ratepayers, to ascertain from their officers whether the gas company had performed their contract in accordance with the deed into which they had entered—a deed which was executed upon the explicit understanding that the company would in good faith carry out what they had promised to do. He regretted, however, that the company had never performed their contract in the manner specified. He thought it was right that the commissioners should call upon their officers to see whether the pavements had been left in a proper state, or whether there had not been some omission on the part of the company which rendered such an enormous expense necessary. (Hear.)

The CHAIRMAN.—Mr. Haywood has handed in a report which shows that very little requires to be done in the streets in consequence of the operations of the gas companies.

Mr. TAYLOR.—If any one with his eyes open says that the streets of the city want nothing done to them, from my own personal observation I must say that I can place no confidence in him.

The CHAIRMAN.—The report states that the streets are in better order than usual.

Mr. TAYLOR.—I request, then, that the report of the surveyor be read.

The SURVEYOR.—In accordance with the resolution of the court, I lay before you the reports of the inspectors of the several districts as to the condition of the pavements; and, as I thought it might be matter of convenience to you, I have made an abstract, from which it appears that the number of streets opened by the new company for the purpose of laying down their pipes was 517. The number of streets thus opened, which were in good repair previously, but now requiring repair to the trenches, is 59. The number requiring relaying, which were in a bad state before, is 65. The number not requiring any repair is 393. Generally speaking, the repairs do not present any very serious aspect.

The CHAIRMAN.—That is a very satisfactory report. (Hear.)

In the course of considerable conversation which followed, the Surveyor further stated that the expenses of repairing the streets thus broken up would not fall upon the commission, but on the gas companies. (Hear.)

Mr. TAYLOR then inquired how many streets were out of repair?

The Surveyor replied, 124.

Mr. TAYLOR wished to know how many of these were occasioned by the works of the Great Central Gas Consumers' Company?

The Surveyor replied, "Probably the whole of them; because those which were not in a good state previously had been made worse by the several openings. My report shows that 59 streets require repair entirely through their works." (Hear.)

Mr. TAYLOR then said it appeared to him that taking the *maximum* there were, on the whole, but 124 streets requiring repair. Now, if the other 400 streets required no repair, for what purpose was the enormous sum of £20,000 required? [A voice—"For putting the streets in order."] He (Mr. Taylor) would like to let the gas company off with the payment of such a sum, but even that would be no indemnity to the city for the enormous evils which had been entailed upon the ratepayers. ("Hear," and "No, no.") As the citizens were now in possession of some of the benefits promised to them by the establishment of this company—and which really amounted to nothing—(laughter)—he thought there could be no objection to call upon the company to perform that which they had solemnly by deed engaged to do. He moved—"That the officers be consequently instructed to communicate with the gas companies, requiring them to put the streets in a proper state of repair before Lady-day next."

Deputy LOTT seconded the motion.

Mr. GODSON thought the remarks of Mr. Taylor were somewhat unreasonable, as the account to which he (Mr. Taylor) referred was but an estimate of probable expenses, against which the citizens had to place the great reduction they now enjoyed in the price of gas. (Hear.) The new company had had to struggle against a large amount of opposition, and every consideration ought to be shown to them for their resolute conduct.

Mr. BLAKE said that in anticipation of the works of the new company the estimate for the past year was only £15,000, because the court had considered that it was not worth while to repair streets which would have to be broken up and relaid. (Hear.) The present estimate of £20,000, as compared with the £15,000 of last year, would only show an average of past years' expenses. If ever a public body was entitled to the gratitude of the public, the Great Central Gas Company was, for the disinterested manner in which they had come forward. (Laughter and "Hear.")

Mr. Deputy BRIDGE thought that the estimates were random estimates, and had been framed simply with a view to probable contingencies. As to the expense of repairs in consequence of the works of the new company, he thought the citizens should not be out of pocket by that, for, if the gas companies had to relay the pavements, surely they ought to be in a better state than they were before. (Hear.)

After some further remarks made by Mr. T. H. HALL and Mr. HAYWOOD, the surveyor,

Mr. H. L. TAYLOR briefly replied, recapitulating the facts stated in his opening address, when the question was put and carried.

CONSOLIDATED AND SEWERS RATE.

On the order of the day for making a consolidated rate of 1s., and a sewers rate of 4d., in the pound, being read,

Mr. TAYLOR moved, as an amendment, "that the former be 10d. only." He considered that, if 124 streets only required repair, so large a sum as £20,000 on that account could not be justly expended.

Mr. Deputy BRIDGE seconded the amendment on the same ground as that urged by Mr. Taylor, and also because there was a balance in the chamber of £7768. 14s. 5d., which was equal to 2d. in the pound.

Mr. GODSON and Mr. T. H. HALL opposed the amendment, considering that the balance in hand was required for works now in progress.

The CHAIRMAN.—The fact is we must have the money or we cannot pay our creditors; and, if you do not make the rate, I, as chancellor of the exchequer, must resign. (Hear, hear.)

Mr. WHITESIDE would vote for the amendment because he found that there were arrears on rates outstanding amounting to £10,747.

The amendment was then put, and carried by a majority of one only, the numbers being 7 to 6.

Mr. Deputy HOLT then said—As the motion just carried is likely to produce financial difficulty, I shall at the next court move that it be rescinded.

Adjourned.

FEBRUARY 4.

Another court of the members of the commission was this day held at the Guildhall. Mr. Deputy Harrison in the chair.

Mr. Dakin (one of the members of the Court of Common Council, and chairman of the Great Central Gas Consumers' Company) appeared at the bar with several gentlemen connected with the company, for the purpose of supporting the prayer of a memorial presented to the court in consequence of certain statements which were reported to have been made in that court on the previous Tuesday. Subjoined is a copy of the memorial:—

"THE WORSHIPFUL THE COMMISSIONERS OF SEWERS.

"Gentlemen,—We have seen by the newspapers that a question has arisen in your court, whether, considering the season of the year, and other circumstances, the pavement of the streets is in a fair state of repair. We understand that it is; but, if it is not so, no blame, we respectfully submit, rests upon our board.

"Since the month of July last we have paid the city paviours £11,500,* the whole amount certified by your surveyor. It includes, we believe, the whole charge for the street-pitching, at the rate of 1s. 8d. per square yard, the stipulated contract price paid by your commission and the other gas and water companies.

"This rate of charge includes the relaying of the stones, if necessary, properly to harden and consolidate the ground.

"The paviour claims from us an extra charge of 10d. per yard on his work, upon the plea that from the great haste in which it was executed, and other circumstances, extra expenses were incurred in replacing and ramming in the sub-stratum of earth and metal so as to make a sound bottom.

"We have been told by competent authority that 1s. 8d. is a large charge, quite sufficient to cover, on the average, all contingencies, particularly so, having regard to the fact that in the present case so large a quantity of work has been done in a few months, which, under ordinary circumstances, is performed in petty jobs, and spread over a surface of many years.

"This board do, however, recognise an equitable claim on the part of the paviour for some extra allowance upon the ground stated by him, and we desire to meet it with becoming liberality, of the extent of which we do not wish to constitute ourselves the sole judges.

"It must be recollected that by our deed the amount of dividend is fixed; as, therefore, every excess of payment out of our capital or income will tend to increase the price of gas to the consumer, we do not feel ourselves at liberty to volunteer any payment beyond our contract. We are, however, willing to leave it to the commission as a public body, or to their surveyor, to hear the case, and to determine how much in equity we ought to pay as a final settlement of the present paving account, leaving us in future to pay in respect of paving future service laying, &c., the same as the other companies.

"We have been surprised to find it suggested that the recent movement of the citizens for cheap gas, of which we have been the willing instruments, has not been of any benefit to the community.

"In 1847, when the agitation commenced, the old companies charged the citizens seven shillings per thousand upon (450,000,000), say four hundred and fifty thousand thousand cubic feet; the citizens now pay for gas of a better quality four shillings per thousand, so that they have already saved and are saving £67,500 per annum below their former surcharge. It is difficult for the mind to appreciate the effect of so large an annual saving, except by comparing it with other annual charges. It is more than three times the annual cost of paving the entire city. It is nearly seven times the annual charge for lighting, and more than ten times the cost of cleansing, the city. It is nearly three times the police-rate levied upon the citizens for guarding their persons and property by night and by day; and it is believed to exceed the whole tax for window-lights in the city; for, as appears by the parliamentary return (in which the amount paid by the city is not mentioned), the whole of the window-tax for the four other largest cities and towns in the kingdom amounts to about £70,000, and in the twelve cities and towns embraced in the return as paying the largest amount the annual assessment to the window-tax does not average £4000 a year each.

"We are aware of the fact that the whole of the ratepayers of the city have not yet become gas consumers; we do not, therefore, desire to cast any additional charge upon the rates, on account of the saving in gas; and we respectfully submit to the commission that such an inference cannot be drawn from the fact that the cost of paving for the ensuing year is estimated at £20,000. During the last year it may be true that the charge was less, because in anticipation, and in consequence of the paving for which *we* had to pay, the general works of the commission were less extensive; but, if you take the average of the preceding seven years, it will be found that the annual cost of this branch of expenditure has exceeded £22,000.

"It is one of the objects of this company to bring the interests of the gas consumers and ratepayers of the city more completely in harmony with each other; we are now serving upwards of 4000 consumers, and we believe our two competitors are supplying between them about the same

* The estimate was £6981.

number,* while the inhabitants assessed to your rates are said to amount to 15,000 or 16,000; we anticipate returning to our consumers during the present year 6d. or 8d. per thousand upon the present charge of 4s., and we confidently believe that we shall thus largely increase the number of consumers, and by further reducing the price we shall bring it within the reach of the humblest inhabitant for domestic and trade use, so that in a short time nearly every ratepayer will, we hope, be likewise a consumer of gas.

"There is another fact of which we submit the commissioners, in considering this question, should not lose sight. The contract for the street-lights is taken at an average of 3s. 4d. per thousand, while the consumers pay 4s., thus giving an advantage to the commission of about 16 per cent., or nearly £2000 upon this annual charge upon their funds. When the old city companies were before the commission, about two years since, they stated that they served the street-lights at less than prime cost, and if they reduced their charge to the consumer below 6s. (the price then paid) they must recompense themselves for their loss by advancing their charge to the commission. We do not intend to engage in a ruinous competition for low prices with our rivals, but we have no hesitation in saying that your commission need not entertain any apprehensions of a surcharge on this account, although the old companies have actually lowered their price to 4s., as, should they throw up their contract, we are willing at a month's notice to take it up on the same terms.

"We have the honour to be, gentlemen, your obedient servants.

"By order of the Board,

"Coleman-street, Feb. 4, 1851." "THOMAS DAKIN, Chairman."

The memorial having been read,

Mr. DAKIN said that he merely wished to make one or two remarks. The attention of the body to which he belonged had been called to the discussion which took place in that court on the previous Tuesday, and of course these gentlemen felt, naturally, very anxious that they should continue to deserve the good opinion of the commissioners. They wished also to make it appear before that court and the public in general that they had in good faith fulfilled all they had undertaken to accomplish. With that view the board had directed that a statement should be drawn up and submitted to the commissioners at their first meeting after the report appeared in the public papers. The object of the document he had laid before them was to show that with regard to the pavements they had always complied with the orders of the commissioners, and paid all moneys they had been called upon to pay. It was to prove also that they were willing then to abide entirely by any directions which that honourable court might think fit to issue, and to show that they (the directors of the Great Central Gas Consumers' Company) should continue to do—as they had always done—everything to which they were bound by their agreement with the commissioners.

The CHAIRMAN wished to ask Mr. Dakin whether he wished to say anything more?

Mr. DAKIN replied that he did not.

Mr. H. L. TAYLOR was surprised at the chairman asking such a question.

The CHAIRMAN considered that he was acting rightly, as that was the usual course.

Mr. H. L. TAYLOR said that, certainly, this might have been done as a matter of course by the chairman; but he (Mr. Taylor) must confess that such a way of coming before the court was most extraordinary. Whenever any remark happened to be made in that court respecting the Great Central Gas Consumers' Company, some parties connected with that company went to that court, not merely with an explanation, or brief statement of facts, to set themselves right with the public and the commissioners, but with a complicated document detailing the whole of their past course, and their future intentions. If they were, upon that occasion, to have anything to do with that memorial, it would be necessary, in the first place, that the communication should be printed, in order that they might fully know what it contained, as it was impossible that those who had heard it read could bear in mind even a tithe of its contents. No doubt there was a great deal in it that was interesting to the company themselves, and unquestionably there was a great deal in it which they were desirous should go forth to the public; but he (Mr. Taylor) would say that, as the document was of such an extraordinary character (and it must, he contended, be allowed to be so), it was impossible for them to entertain it, if they paid any attention to the clause in the act of Parliament with respect to the introduction of special business. He considered they were altogether out of order. (Hear.) The entertainment of the document was altogether an utter violation of an act of Parliament. (Loud cries of "No, no.") Parties might cry "No, no," but he said "Yes, yes;" and why did he say so? Simply because the document was an "extraordinary" document, and would lead to the introduction of "extraordinary" business, and the act specified that "no extraordinary business would be transacted at the usual weekly meeting of the commission without previous notice of the same was given." In that case no such notice had been given. (Cries of "Yes, certainly, there has been.") He contended that it was not so, and therefore they could not enter into any discussion upon the matter, or enter the document on their minutes. (Increased interruption.) There was much in the memorial which was most decidedly objectionable, and, though it might be very convenient for the company to publish their affairs in such a manner, he thought they had no right to do so through that commission.

Deputy PEWTRESS rose to order. Mr. Taylor was discussing a question which he had contended could not be discussed, thus violating his own rule.

Deputy LOTT contended that the document ought not to have been read.

The CHAIRMAN remarked that he did not wish to stop Mr. Taylor, but he (the chairman) would beg to remind that gentleman that, as he had the question on a point of order, the general subject could not be gone into. He thought it would be better if the clerk were to read the clause in the act to which Mr. Taylor had alluded.

Mr. DAW, the clerk, did so accordingly. The clause was to the following effect:—"That no new rules or regulations be adopted, or any extraordinary business discussed, at the weekly meeting of the commissioners, unless notice thereof has been given at the previous court, and also in the printed or written notice sent to each member."

After some remarks made by Deputy STEVENS and Mr. BLAKE,

Mr. TAYLOR moved—"That the memorial do lie on the table."

Deputy LOTT seconded the motion. He considered that the interpretation of the clause by Mr. Taylor was perfectly correct, and he thought that the court ought not to be the medium of making communications to the public respecting speculative companies. There was one point, however, in the memorial to which he would call the attention of the court. It was originally put forth that £6000 would suffice to pay all the expenses of the paving, whereas it now appeared that the company had already paid upwards of £11,000. That was not the only instance in which the company had not performed their engagements, for they had undertaken to open all the streets principally by night; this they had not done; the fact was they (the Gas Company) appeared to do as they liked with the commission, and then they came to that court and obtained a bill of indemnity and subsequent absolution. (Laughter.)

Deputy HOLT then moved that the memorial be referred to the general purposes committee, to examine and report. He did this on the ground that the memorial called upon the commission to constitute itself a jury to assess the value of the work done by Mr. Chadwick.

Deputy PEWTRESS seconded the amendment.

Mr. BLAKE supported the amendment. He was astonished that Mr. Taylor should seek to constitute that court an arena in which to impugn the motives of a public body which was not in a position to vindicate itself. He was sure that in his cooler moments Mr. Taylor would be the first to condemn such a proceeding. He considered that the proposition on the part of the company was liberal and fair in every sense of the word.

Deputy BRIDGE thought the proposition to refer the motion to a committee was rather premature. The question was one entirely between the company and the contractor, and the commissioners ought not to throw themselves into the battle. He thought that considerable private interest existed with reference to the new company in that court, and that ought not to be.

Deputy HOLT and Mr. GODSON individually denied that such was the case.

After an irregular conversation,

The CHAIRMAN said that it did not appear to be generally understood that by the deed between the new company and the commission the surveyor of that court was bound to certify all bills to be paid by them for the pavements. In that case he (the surveyor) had been called upon to certify something beyond the price contracted for by the commission; and, although all the parties agreed that it should be more, the surveyor considered that he ought to have the order of the court upon the subject. The amendment proposed that the general purposes committee should be the arbitrators in the case.

Mr. HALL vindicated the general character of the memorial, and considered that the proposal of the company was a most honourable one.

After some explanations of a financial character made by the surveyor, Mr. HAYWOOD,

Mr. GODSON said that, if the course recommended by his friend Mr. H. L. Taylor was pursued, it would tend to deter persons coming to that court for redress. Mr. Taylor proposed that the memorial presented should lie upon the table. Of course it would then be open at a future time for any member of that court to take up the subject; but, he would ask, with what hope of success? His friend, it would be observed, "died very hard," whilst others yielded to the "soft impeachment." (Laughter.) He admitted that there were many friends of the new company in that court, as there were also in the Common Council. But what of that? They but represented the feelings of the great body of the citizens upon that subject. He trusted the matter would be referred, and therefore he should support the amendment.

After a desultory debate, in which Messrs. ELLIOTT, HUMFREYS, and WHITESIDE took part,

Mr. TAYLOR replied at some length.

The amendment was then put and carried by a majority of 10, the numbers being—

For the reference to the general purposes committee	17
For the original motion	7
Majority	—10

THE CONSOLIDATED RATE.

Deputy HOLT then brought forward the motion of which he had given notice, upon the subject of the consolidated rate. It will be remembered that at the last court Mr. Taylor carried a resolution that the ratepayers be charged, on the ensuing year's rental, 10d. in the pound only, instead of one shilling. Deputy Holt, upon this occasion, moved that the rate be one shilling. He considered that amount was absolutely necessary for the prevention of financial difficulty.

Mr. GODSON seconded the motion.

Mr. H. L. TAYLOR moved, as an amendment, "the previous question."

Deputy BEDFORD seconded the amendment.

After a long conversation, the shilling rate was carried by 13 to 9.

The commissioners shortly afterwards adjourned.

* We have ascertained from authentic sources that upwards of 11,000 consumers have stuck to the old companies, including nearly all the large public establishments of the city. The majority of the 4000 consumers above mentioned are small traders, many of whom never were consumers of the old companies.

Share List.

THE PRICES QUOTED ARE THOSE AT WHICH THE LAST SALES HAVE BEEN MADE.

The Companies whose names are printed in italic type are incorporated by Act of Parliament.

Number of Shares issued.	Amount per Share £	Name of Company.	Amount paid up per Share £ s. d	Dividend per Cent. per Ann. £ s. d	Price. £ s. d
		ENGLAND.			
		Aberdare			
		Aberystwith			
		Abingdon			
		Accrington £7000		5 0 0	
		Alcester			
		Alford, Lincolnsh.			
		Alfreton			
		Alnwick			
		Alston Moor			
250	10	Alton	10 0 0	5 0 0	10 0 0
800	5	Altrincham	5 0 0		
		Amlwch			
160	10	Ampthill	10 0 0	5 0 0	10 0 0
350	10	Andover	10 0 0	6 0 0	11 0 0
		Appleby			
		Arundel			
		Ashbourn, Derby			
		Ashburton			
		Ashby-de-la-Zouch			
		Ashford, Kent			
		Ashton-under-Line £39,700		10 0 0	
		Atherstone			
		Axminster			
225	20	Aylesbury	20 0 0	5 0 0	21 0 0
		Aylsham, Norfolk			
		Bacup, Yorkshire			
		Bakewell			
		Baldock			
140	25	Banbury	25 0 0		
		Bangor			
500	5	Barking, Essex	4 10 0	5 11 0	5 0 0
250	10	Barnard Castle	10 0 0	5 10 0	10 15 0
		Barnet			
		Barnsley £6000		7 10 0	
100	20	Barnstaple	20 0 0	7 10 0	25 0 0
		Barton			
120	25	Basingstoke	25 0 0	8 0 0	28 0 0
2400	20	*Bath*	16 0 0	6 0 0	25 to 30
		Battle £2000		6 0 0	
56	26½	Bawtry	26 10 0	5 0 0	25 0 0
		Beaumaris			
		Beccles, Bungay, and Lowestoft			
		Bedford			
		Bedworth			
		Belford			
		Bedale, Yorkshire			
		Belper			
		Beminster			
		Berkhempstead			
700	5½	Berwick-on-Tweed	5 10 0	6 8 0	5 15 0
		Beverley			
		Bewdley			
280	10	Bideford	10 0 0	6 0 0	10 10 0
		Biggleswade			
160	10	Bicester	10 0 0	5 0 0	10 0 0
		Bilston £15,100		6 10 0	
		Billericay			
		Bingley £7400		4 0 0	
		Birkenhead and Claughton £70,000	35 0 0	3 0 0	32 to 34
2400	50	*Birmingham and Staffordshire*	50 0 0	8 0 0	84 to 86
	25	*Ditto*, new shares	7 10 0	8 0 0	12 0 0
704	75	*Birmingham*	75 0 0	9 0 0	128 to 130
		Bishop's Auckland			
		Bishop's Stortford			
		Blackburn £30,000		10 0 0	
		Blandford			
		Blythe			
		Bodmin			
		Boznor			
		Bolton £38,582		9 19 5	
		Boroughbridge			
		Boston £8000		10 0 0	
200	10	Bourn	10 0 0	5 0 0	
		Brackley			
		Bradford, Wilts			
		Bradford, Yorksh. £45,000		9 10 0	
		Brampton, Cumb.			
		Brandon, Suffolk			
		Brecon			
		Bridge-end, Glam.			
		Brierly Hill			
2250	20	*Brighton*	20 0 0	5 0 0	14 to 15
1125	20	,, new shares	16 0 0	5 0 0	
		Brighton and Hove £50,276			
4250	20	*Bristol*	20 0 0	9 0 0	37 0 0
1725	25	*Bristol and Clifton*	25 0 0	6 0 0	25 0 0
		Brixham			
		Braintree			
750	50	*Brentford*	50 0 0	6 0 0	44 to 46
800	25	,, new shares	11 0 0	6 0 0	11 0 0
		Brentwood			
		Bridgwater £6000		3 0 0	
400	10	Bridlington	10 0 0	5 0 0	10 0 0
		Bridport			
		Brigg			
100	50	Bromley, Kent	50 0 0	6 0 0	52 10 0
		Bromsgrove			
		Broughton			
120	10	Bruton	10 0 0	4 0 0	8 0 0
100	25	Buckingham	25 0 0	5 0 0	25 0 0
		Bungay (see Beccles)			
		Burford			
		Burnley £19,946		4 10 2	
		Bursiem			
		Burton-on-Trent			
		Bury St. Edmund's £10,500		5 0 0	
		Bury, Lanc. £6570			
		Buxton			
		Callington			
		Calne, Wilts			
		Camborne			
		Cambridge £34,960		9 0 0	
240	50	*Canterbury* Gas and Water	50 0 0	6 0 0	57 to 58
240	25	*Ditto*, second issue	25 0 0	6 0 0	28 to 29
		Cardiff £12,000		7 10 0	
		Carmarthen			
		Chapel on the Frith			
		Chard			
		Chatham (see Rochester)			
		Chatteris			
		Cheadle			
		Chelmsford			
		Cheltenham £18,732		8 10 0	
		Chepstow			
		Chertsey			
230	10	Chesham, Bucks	10 0 0		
		Chester			
		Chester-le-Street			
		Chesterfield £13,123		4 17 6	
240	25	Chichester	25 0 0	6 0 0	30 0 0
		Chippenham			
		Chipping Norton			
		Chirk			
		Chorley			
		Chudleigh			
		Cirencester			
		Clifton (*Bristol and Clifton*)			
		Cleckheaton, York.			
		Clitheroe			
		Cockermouth			
		Colchester			
		Collumpton			
		Colne, Lancashire			
		Coleford, Gloucest.			
		Coggeshall			
		Congleton £5000		5 0 0	
		Cowbridge			
800	25	*Coventry*	25 0 0	6 0 0	20 0 0
		Cowes			
		Crewkerne			
		Croydon ... £20,000		5 0 0	
		Cranbrook ... £1900		5 0 0	
		Crediton			
		Crewe, Cheshire			
		Cricklade			
		Darlaston			
		Darlington			
250	20	Dartford	20 0 0	7 10 0	27 0 0
		Dartmouth			
125	20	Daventry	20 0 0	6 0 0	24 8 0
		Dawley, Shrop.			
		Dawlish			
500	6	Denbigh	6 0 0	5 0 0	6 0 0
820	10	Deptford	10 0 0	5 0 0	4 10 0
325	50	*Derby*	50 0 0	10 0 0	
90	20	Dereham (East)	20 0 0	4 10 0	
1000	5	*Dewsbury*	5 0 0	10 0 0	8 12 6
		Devizes			
400	5	*Devonport*	5 0 0	6 0 0	6 5 0
		Doncaster			
280	25	Dorchester	25 0 0	5 0 0	30 0 0
120	25	Dorking	20 10 0	5 0 0	21 10 0
		Douglas, Isle of M.			
209	56½	*Dover*	56 10 0	4 15 4	55 0 0
		Downham			
		Driffield			
		Droitwich			
600	20	*Dudley*	20 0 0	4 0 0	15 to 16
		Duumow			
		Dunstable			
		Durham			
276	9	Dursley, Gloster	9 0 0	5 10 0	8 0 0
		East Grinstead			
		Elland			
		Ellesmere			
		Enfield			
300	19	Epsom and Ewell	19 0 0		
		Evesham			
		Exeter £40,000		10 0 0	
		Exmouth			
		Eye, Suffolk			
64	25	Fakenham	25 0 0	5 0 0	25 0 0
		Falmouth			
		Fareham			
120	25	Farnham	25 0 0	10 0 0	42 0 0
		Farringdon			
		Faversham			
		Ferrybridge			
		Fleetwood			
		Folkestone			
		Fowey			
240	5	Framlingham	3 10 0		
		Frome			
		Garstang			
		Gillingham, Dorset			
		Glastonbury			
		Glossop ... £10,000		9 0 0	
		Gloucester £25,000		7 10 0	
		Gomersal			
		Godalming			
		Gosport			
		Grantham			
1700	20	Gravesend	20 0 0	5 0 0	21 0 0
1000	10	*Great Grimsby*	6 10 0	8 0 0	8 5 0
	25	Guildford	25 0 0	4 0 0	20 0 0
		Guisborough			
		Hadleigh			
		Hales Owen			
300	6	Halesworth	6 0 0	7 10 0	5 10 0
		Halifax £15,000		10 0 0	
		Halstead			
		Hampton Court			
		Harrogate £10,000		5 0 0	
		Hartlepool £15,137		7 10 0	
		Haslingden, Lansh.			
330	50	Hastings and St. Leonard's	50 0 0	6 0 0	60 0 0
		Haverfordwest			
		Haverhill			
		Haworth, Yorks.			
		Hayle			
		Helstone			
		Hemel Hempstead			
300	10	Henley-on-Thams.	10 0 0		
		Hereford £5300		4 0 0	
		Herne Bay			
270	10	Hexham	10 0 0	7 0 0	12 0 0
		Heywood £10,000		5 0 0	
		Highworth (Wilts)			
230	10	Hinckley	10 0 0	5 0 0	7 0 0
		Hindley, Lancash.			
		Hitchen			
		Hythe			
		Hoddesden			
		Holbeach			
		Holmfirth £8880		3 10 0	
		Holyhead			
		Holywell (see British Provincial)			
		Honiton			
		Horncastle			
	10	Houghton-le-Sprg.	10 0 0	8 0 0	
		Horsham			
		Howden			
		Hull, Sculcoats (see British Provin.)			
		Hull, £11,712. 10s.		5 0 0	
210	10	Hungerford	10 0 0	5 0 0	10 0 0
520	5	High Wycombe	5 0 0		5 0 0
		Ilminster			
		Ilford			
		Ilfracombe			
		Ironbridge			
1400	10	*Ipswich*	10 0 0	7 10 0	15 0 0
1400	10	,, new shares	5 0 0	7 10 0	
800	25	*Isle of Thanet* (Ramsgate & Mar.)	20 0 0	5 0 0	20 to 21
		Kendal £9100		8 15 0	
		Kenilworth			
		Keswick			
		Kettering	25 0 0	5 0 0	25 0 0
100	25	*Kidderminst.* £10000		5 0 0	
		King's Langley			
		Kington, Hereford			
		Kirkby Lonsdale			
		Kirkham, nr. Preston			
		Knutsford			
		Lancaster			
		Llanelly £3000		5 0 0	
		Llandovery			
		Leamington Priors £22,500		6 0 0	
		Leatherhead			
		Ledbury			
		Leeds Old Comp. old stk., £60,300		10 0 0	
		new ,, £23,775		6 0 0	
		Leeds New £60,000		10 0 0	
		Leek			
		Leicester ... £36,330		7 0 0	
		Leigh			
125	20	Leighton Buzzard	20 0	5 0 0	
		Leominster			
		Leyburn, Yorksh.			
		Liskeard			
330	25	Lewes	25 0 0	5 0 0	23 0 0
		Lincoln £8000		10 0 0	
		Leyland, Lancash.			
		Littlehampton			
250	20	Lichfield	20 0 0	7 10 0	27 10 0
		Liverpool United	100 0 0	9 0 0	174 to 176
		,, ¼ sh.	25 0 0	9 0 0	43½ to 43¾
		Langport			
		London Comps.—			
5000	40	*British*	18 0 0	5 0 0	12 to 13
		,, debentures £46,300		4 0 0	
5000	20	,, Provincial—(Gloucester, Holywell, Hull, Norwich, Stoke, Trowbridg)	20 0 0	7 0 0	16 to 18
	20	,, Prov., new	6 0 0	7 0 0	4 to 5
	25	*Commercial*	25 0 0	6 0 0	23½ to 24½
	25	,, new shares	15 0 0	6 0 0	par to 1dis
	25	,, ,,	2 10 0	6 0 0	par to 1dis
12,000	50	*Chartered*	50 0 0	6 0 0	45 to 47
6000	50	,, new shares	10 0 0	6 0 0	9 to 9¼
2000	150	*City of London*	150 0 0	5 0 0	140 to 150
4000	50	*Equitable*	50 0 0	2 10 0	29 to 30
		,, debentures £46,000			
10,000	20	European—(Amiens, Boulogne, Caen, Havre, Nantes, and Rouen)	20 0 0	5 0 0	10 to 12
	20	,, do. new	5 10 0	5 0 0	3½ to 4

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
15,000	10	Gt.Cntl.Consumers	10 0 0		
8000	50	*Impl.Continental* —(Amsterdam, Aix-la-Chapelle Antwerp, Berlin, Bordeaux, Brussels, Cologne, Frankft., Ghent, Haarlem Hanover, Lille, Marseilles, Rotterdam, Toulouse, Vienna)	42 0 0		
7000	50	„ new shares	41 0 0		
	50	„ third issue	42 10 0		
10,000	50	*Imperial*	50 0 0	6 0 0	
3000	50	„ new shares	35 0 0	6 0 0	
		„ debentures £50,500			
4000	40	*Independent*	40 0 0	6 0 0	
8000	25	*London*	25 0 0		
6000	25	„ preference	25 0 0	6 0 0	
		„ debentures £150,000			
9000	50	*Phœnix*	49 0 0	4 10 0	
1000	100	*Ratcliff*	90 0 0	5 0 0	
4000	25	*South Metrop.*	25 0 0	6 0 0	
9000	50	United General—(Cork, Dublin, Limerick)	50 0 0	2 0 0	
12,500	20	Western	18 0 0		
		Lostwithiel			
		Loughborough			
240	25	*Louth*	25 0 0	6 0 0	
		Lowestoft (see Beccles)			
611	5	Ludlow Union	5 0 0	6 0 0	
		Luton			
		Lutterworth			
		Lyme Regis			
		Lymington			
		Malmesbury			
		Macclesfield 32,000		3 15 0	
		Maidenhead			
300	50	*Maidstone*	50 0 0	10 0 0	
		Maldon			
		Marlborough			
		Malton (New)			
		Malvern			
		Manningtree			
		Mansfield £5000		10 0 0	
		March			
		Margate (see I. of T.			
		Market Deeping			
132	25	Market Harboro'	25 0 0	6 0 0	
		Market Raisin			
		Market Weighton			
		Marlow			
370	10	Maryport	10 0 0	6 0 0	
		Melksham			
		Melton Mowbray			
		Merthyr Tydvil			
		Mere			
		Middleton £9039		5 0 0	
		MidsummerNorton			
		Middlesboro'			
		Mildenhall			
		Mitcham			
		Mold			
700	10	Monmouth Gas and Water	10 0 0	5 0 0	
		Monk Wearmouth			
		Moreton in Marsh			
		Morley			
		Mottram			
		Nantwich			
		Neath			
		Needham Market			
		Newark £5000		10 0 0	
250	20	Newbury	20 0 0	5 0 0	
13,000	5	Newcastle & Gateshead Union	5 0 0	8 0 0	
		Newcastle-under-Lyne £6200		4 0 0	
600	5	Newmarket	5 0 0	6 0 0	
		Newnham, Glost.			
		Newent			
		New Mills & Hayfield £2115			
		Newport, M. £11720		8 0 0	
320	50	*Newport, Isle of W.*	38 0 0	4 0 0	
		Newport Pagnell			
		Newport, Salop			
		Newton Abbot			
		Newton, Lanc.			
		Northallerton			
		North Walsham			
542	20	*Northampton*	18 0 0	10 0 0	
		Northwich			
		Norwich (see British Pro. £40,000		7 0 0	
900	50	*Nottingham*	50 0 0	10 0 0	
900	50	New shares		10 0 0	
		Nuneaton			
		Oakham			
		Oakhampton			
200	10	Odiham, Hants	10 0 0	3 10 0	
		Oldham			
		Ongar			
		Ormskirk			
		Otley, Yorkshire			
		Oundle			
		Oxford £18,000		9 10 0	
		Over Darwen £8000		5 0 0	
		Padstow			
		Pately Bridge, Yrk.			
250	20	Penrith	15 0 0	6 10 0	
		Penryn			
		Penzance			
200	10	Petworth	10 0 0	9 10 0	
		Pickering			
3000	10	*Plymouth & Stonehouse*	10 0 0	6 0 0	
		Pocklington			
		Pontefract			
		Pontypridd			
400	10	Poole	10 0 0	5 0 0	
		Port Madoc			
600	50	*Portsea Island*	53 0 0	5 0 0	
400	10	Prescott	9 0 0	4 13 4	
		Preston £52,500		10 0 0	
		Pwllheli			
		Pudsey £12,000		5 0 0	
		Radcliff and Pilkington £9000		4 12 10	
		Ramsay, I. of Man			
		Ramsgate (see Isle of Thanet)			
		Ravenglass			
1000	10	*Reading*	10 0 0	3 0 0	
500	20	*Reading Union*	20 0 0	6 0 0	
		Redditch			
		Redruth			
		Reigate			
		Retford (East)			
		Rhyl			
		Richmond (Surrey)			
		Ripon			
		Rochester and Chatham £20,000		6 0 0	
		Rochford			
		Rockingham			
		Romford			
		Ross			
		Rotherham £6100		10 0 0	
		Royston			
		Ruabon			
		Rugby			
		Rugeley			
		Runcorn £11,000		7 10 0	
500	10	Ryde	10 0 0	6 0 0	
		Rye			
		Romsey			
		Saddleworth			
225	20	Saffron Walden	20 0 0	3 15 0	
		St. Austel			
		St. Asaph			
		St. Colomb			
		St. Helen's £7500		7 10 0	
		St. Helier's (Jersey)			
		St. Ives, Hunting.			
		St. Ives, Cornwall			
250	10	St. Neot's	10 0 0	8 0 0	
		St. Peter's Port, (Guernsey)			
320	25	Salisbury	25 0 0	6 0 0	
		Sandbach			
140	10	Saxmundham	10 0 0	5 0 0	
		Scarborough			
		Seaham Harbour			
		Selby			
		Settle			
290	10	Sevenoaks	10 0 0	5 0 0	
		Shaftesbury			
5400	25	*Sheffield United*	24 0 0	8 6 8	
		Shelton, Potteries (see Brit. Prov.)			
		Shepton Mallet			
		Sherborne			
2914	5	Shields, North (Tynemouth)	5 0 0	3 0 0	
		Shields (South)			
		Shifnal, Salop			
1000	5	*Shipley*	5 0 0	6 0 0	
		Shipston-on-Stour			
		Shoreham			
		Shrewsbury £10,000		7 0 0	
400	10	Skipton	10 0 0	4 0 0	
		Sleaford			
250	10	Slough	10 0 0		
		Snaith			
		Soham			
		Southwold			
		South Molton			
1000	50	*Southampton*	32 0 0	5 0 0	
		Sowerby, Yorksh.			
		Stretford			
		Stokesley			
		Stafford £10,000		5 0 0	
		Staines and Egham			
		Staley Bridge £15,000		10 0 0	
		Stamford £11,250		3 0 0	
		Stockton-on-Tees £7980		9 5 0	
840	9½	Stockton, New	9 10 0	9 0 0	
960	10	Stoke-upon-Trent	10 0 0	5 10 0	
500	10	„ new shares	4 0 0	5 10 0	
		Stone, Stafford			
		Stoney Stratford			
		Stourbridge			
		Stowmarket			
150	20	Stratford-on-Avon	20 0 0	7 10 0	
		Stroud			
169	10	Swaffham	10 0 0	5 0 0	
		Swansea £9000			
		Sudbury			
		Sunderland, old			
6400	5	*Sunderland*, new	5 0 0		
		Sutton			
		Swindon			
2800	5	*Taunton*	5 0 0	None	
		Tadcaster			
		Tamworth			
		Tavistock			
		Teignmouth			
		Tenbury			
		Tenby			
		Tenterden £2000		2 10 0	
		Tetbury, Gloster			
		Tewkesbury			
		Thame			
		Thetford			
		Thirsk			
		Thornbury			
		Thorne			
		Tiverton			
670	5	Todmorden	3 0 6		
		Torquay			
		Torrington, Devon			
		Totnes			
		Totnes and Bridgetown Consumers			
4000	5	Tottenham	3 10 0	6 0 0	
		Towcester			
		Tring			
		Trowbridge (see British Provin.)			
75	50	Truro	50 0 0	2 0 0	
		Tunbridge			
		Tunbridge Wells			
		Ulverston			
		Uppingham			
240	5	Upton-on-Severn	5 0 0	5 0 0	
		Usk, Monmouth			
		Uttoxeter			
		Uxbridge			
1000	25	*Wakefield*, old capl	25 0 0	6 0 0	
1600	5	„ new „	5 0 0	6 0 0	
300	10	Wallingford	10 0 0	5 0 0	
		Wandsworth			
		Wantage			
		Warrington £2304		10 0 0	
100	10	Wareham	10 0 0	3 10 0	
120	25	Warminster	25 0 0	5 0 0	
		Warth			
		Warwick £15,000		6 0 0	
		Watford			
		Welchpool, Mntgy.			
		Wellingborough			
		Wellington, Salop			
		Wellington, Smrst.			
		Wells, Smrst. £5000		7 10 0	
		Westbury			
		Weston-sup.-Mare			
2000	5	West Ham	5 0 0	6 0 0	
		Whitby			
		Whitehaven			
		Whitstable			
		Whittlesea			
		Wigan £10,160		12 10 0	
		Willenhall			
		Winchelsea			
		Winslow			
240	10	Wimborne Minster	10 0 0		
		Wincanton			
360	50	Winchester	50 0 0	6 0 0	
900	12½	Windsor	12 10 0	10 0 0	
		Witham			
		Witney			
4448	10	*Wolverhampton*	10 0 0	7 0 0	
		Woburn			
210	10	Wokingham	10 0 0		
		Woodbridge			
		Wooler			
		Wotton-un.-Edge			
		Worcester £29,000		8 0 0	
		Workington			
		Worksop and Radford			
		Wirksworth			
		Worthing			
		Wrexham			
		Woolwich			
		Woolwich Consms.			
		Woolwich (North)			
		Wymondham			
		Yarm			
795	20	Yarmouth	20 0 0		
		Yeadon, near Leeds			
		Yeovil			
		York Untd. £55,000		7 0 0	
		SCOTLAND.			
		Aberdeen			
		Airdrie			
		Alloa			
		Annan			
		Anstruther			
		Ardrossan			
550	20	Arbroath	20 0 0	7 10 0	
		Auchterarder			
750	2	Auchtermuchty	2 0 0	6 0 0	
		Ayr, old			
		Ditto, new			
		Banff			
		Barrhead			
		Bathgate			
		Beith			
		Bervie			
		Biggar			
		Blairgowrie			
300	6	Borrowstowness	6 0 0	5 0 0	
		Brechin			
		Bridge of Allan			
		Broughty Ferry			
		Burntisland			
		Calien			
		Campbelton			
		Clackmannan			
		Coatbridge			
		Coldstream			
		Collinsburgh			
		Crieff			
		Crail, Fife			
		Cumbernauld			
		Cumnock			
600	5	Cupar Angus	5 0 0	6 0 0	
250	10	Cupar Fife	10 0 0	7 10 0	
		Dalkeith			
		Dingwall			
		Dornoch			
		Douglas			
		Dumbarton			
400	20	Dumfries	14 0 0	5 0 0	
		Dunbar			
		Dunblane			

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
		Pocklington			
		Pontefract			
		Pontypridd			
400	10	Poole	10 0 0	5 0 0	10 0 0
		Port Madoc			
600	50	*Portsea Island*	53 0 0	5 0 0	45 to 47
400	10	Prescott	9 0 0	4 13 4	7 0 0
		Preston £52,500		10 0 0	
		Pwllheli			
		Pudsey £12,000		5 0 0	
		Radcliff and Pilkington £9000		4 12 10	
		Ramsay, I. of Man			
		Ramsgate (see Isle of Thanet)			
		Ravenglass			
1000	10	*Reading*	10 0 0	3 0 0	7 0 0
500	20	*Reading Union*	20 0 0	6 0 0	17 0 0
		Redditch			
		Redruth			
		Reigate			
		Retford (East)			
		Rhyl			
		Richmond (Surrey)			
		Ripon			
		Rochester and Chatham £20,000		6 0 0	
		Rochford			
		Rockingham			
		Romford			
		Ross			
		Rotherham £6100		10 0 0	
		Royston			
		Ruabon			
		Rugby			
		Rugeley			
		Runcorn £11,000		7 10 0	
500	10	Ryde	10 0 0	6 0 0	12 0 0
		Rye			
		Romsey			
		Saddleworth			
225	20	Saffron Walden	20 0 0	3 15 0	19 0 0
		St. Austel			
		St. Asaph			
		St. Colomb			
		St. Helen's £7500		7 10 0	
		St. Helier's (Jersey)			
		St. Ives, Hunting.			
		St. Ives, Cornwall			
250	10	St. Neot's	10 0 0	8 0 0	12 0 0
		St. Peter's Port, (Guernsey)			
320	25	Salisbury	25 0 0	6 0 0	28 to 30
		Sandbach			
140	10	Saxmundham	10 0 0	5 0 0	10 0 0
		Scarborough			
		Seaham Harbour			
		Selby			
		Settle			
290	10	Sevenoaks	10 0 0	5 0 0	10 0 0
		Shaftesbury			
5400	25	*Sheffield United*	24 0 0	8 6 8	32 0 0
		Shelton, Potteries (see Brit. Prov.)			
		Shepton Mallet			
		Sherborne			
2914	5	Shields, North (Tynemouth)	5 0 0	3 0 0	5 0 0
		Shields (South)			
		Shifnal, Salop			
1000	5	*Shipley*	5 0 0	6 0 0	5 10 0
		Shipston-on-Stour			
		Shoreham			
		Shrewsbury £10,000		7 0 0	
400	10	Skipton	10 0 0	4 0 0	11 0 0
		Sleaford			
250	10	Slough	10 0 0		
		Snaith			
		Soham			
		Southwold			
		South Molton			
1000	50	*Southampton*	32 0 0	5 0 0	
		Sowerby, Yorksh.			
		Stretford			
		Stokesley			
		Stafford £10,000		5 0 0	
		Staines and Egham			
		Staley Bridge £15,000		10 0 0	
		Stamford £11,250		3 0 0	
		Stockton-on-Tees £7980		9 5 0	
840	9½	Stockton, New	9 10 0	9 0 0	8 0 0
960	10	Stoke-upon-Trent	10 0 0	5 10 0	10 0 0
500	10	„ new shares	4 0 0	5 10 0	10 0 0
		Stone, Stafford			
		Stoney Stratford			
		Stourbridge			
		Stowmarket			
150	20	Stratford-on-Avon	20 0 0	7 10 0	30 0 0
		Stroud			
169	10	Swaffham	10 0 0	5 0 0	5 10 0
		Swansea £9000			
		Sudbury			
		Sunderland, old			
6400	5	*Sunderland*, new	5 0 0		
		Sutton			
		Swindon			
2800	5	*Taunton*	5 0 0	None	2 10 0
		Tadcaster			
		Tamworth			
		Tavistock			
		Teignmouth			
		Tenbury			
		Tenby			
		Tenterden £2000		2 10 0	
		Tetbury, Gloster			
		Tewkesbury			
		Thame			
		Thetford			
		Thirsk			
		Thornbury			
		Thorne			
		Tiverton			
670	5	Todmorden	3 0 6		
		Torquay			
		Torrington, Devon			
		Totnes			
		Totnes and Bridgetown Consumers			
4000	5	Tottenham	3 10 0	6 0 0	3 0 0
		Towcester			
		Tring			
		Trowbridge (see British Provin.)			
75	50	Truro	50 0 0	2 0 0	
		Tunbridge			
		Tunbridge Wells			
		Ulverston			
		Uppingham			
240	5	Upton-on-Severn	5 0 0	5 0 0	5 0 0
		Usk, Monmouth			
		Uttoxeter			
		Uxbridge			
1000	25	*Wakefield*, old capl	25 0 0	6 0 0	25 0 0
1600	5	„ new „	5 0 0	6 0 0	5 0 0
300	10	Wallingford	10 0 0	5 0 0	8 0 0
		Wandsworth			
		Wantage			
		Warrington £2304		10 0 0	
100	10	Wareham	10 0 0	3 10 0	8 0 0
120	25	Warminster	25 0 0	5 0 0	27 0 0
		Warth			
		Warwick £15,000		6 0 0	
		Watford			
		Welchpool, Mntgy.			
		Wellingborough			
		Wellington, Salop			
		Wellington, Smrst.			
		Wells, Smrst. £5000		7 10 0	
		Westbury			
		Weston-sup.-Mare			
2000	5	West Ham	5 0 0	6 0 0	5 0 0
		Whitby			
		Whitehaven			
		Whitstable			
		Whittlesea			
		Wigan £10,160		12 10 0	
		Willenhall			
		Winchelsea			
		Winslow			
240	10	Wimborne Minster	10 0 0		
		Wincanton			
360	50	Winchester	50 0 0	6 0 0	
900	12½	Windsor	12 10 0	10 0 0	23 0 0
		Witham			
		Witney			
4448	10	*Wolverhampton*	10 0 0	7 0 0	15 0 0
		Woburn			
210	10	Wokingham	10 0 0		10 0 0
		Woodbridge			
		Wooler			
		Wotton-un.-Edge			
		Worcester £29,000		8 0 0	
		Workington			
		Worksop and Radford			
		Wirksworth			
		Worthing			
		Wrexham			
		Woolwich			
		Woolwich Consms.			
		Woolwich (North)			
		Wymondham			
		Yarm			
795	20	Yarmouth	20 0 0		15½ to 16½
		Yeadon, near Leeds			
		Yeovil			
		York Untd. £55,000		7 0 0	
		SCOTLAND.			
		Aberdeen			
		Airdrie			
		Alloa			
		Annan			
		Anstruther			
		Ardrossan			
550	20	Arbroath	20 0 0	7 10 0	7 10 0
		Auchterarder			
750	2	Auchtermuchty	2 0 0	6 0 0	2 10 0
		Ayr, old			
		Ditto, new			
		Banff			
		Barrhead			
		Bathgate			
		Beith			
		Bervie			
		Biggar			
		Blairgowrie			
300	6	Borrowstowness	6 0 0	5 0 0	8 0 0
		Brechin			
		Bridge of Allan			
		Broughty Ferry			
		Burntisland			
		Calien			
		Campbelton			
		Clackmannan			
		Coatbridge			
		Coldstream			
		Collinsburgh			
		Crieff			
		Crail, Fife			
		Cumbernauld			
		Cumnock			
600	5	Cupar Angus	5 0 0	6 0 0	5 10 0
250	10	Cupar Fife	10 0 0	7 10 0	14 0 0
		Dalkeith			
		Dingwall			
		Dornoch			
		Douglas			
		Dumbarton			
400	20	Dumfries	14 0 0	5 0 0	20 0 0
		Dunbar			
		Dunblane			

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
		Dundee, old £29,687		4 4 0	
		,, new £33,851		2 10 0	
860	10	Dunfermline	10 0 0	6 0 0	12 12 0
		Dunkeld			
		Dunse			
		Dysart			
6000	25	*Edinburgh Gas Co.*	25 0 0	10 0 0	45 0 0
		,, *and Leith Co.* £98,640		6 10 0	
		Elie			
		Elgin			
		Falkirk, old			
		,, new			
		Falkland			
		Ferry Port on Craig			
		Fochabers			
		Forfar			
		Fort William			
		Fraserburgh			
		Galashiels			
		Garlieston			
		Gatehouse n. Fleet			
		Girvan			
		Glasgow £123,500		7 10 0	
15000	10	*Glasgow City and Suburban*	9 0 0	6 10 0	9 0 0
		Grangemouth			
		Haddington			
		Hamilton £7500		8 0 0	
		Hawick			
		Helensburgh			
		Huntly			
		Inveraray			
400	1	Inverkeithing	1 0 0	5 0 0	1 0 0
1200	10	*Inverness Gas and Water*	10 0 0	5 10 0	15 0 0
2400	5	,, new shares	1 5 0	5 10 0	2 5 0
		Irvine			
		Jedburgh			
		Johnstone, near Paisley			
		Keith			
		Kelso			
		Kilmarnock			
		Kincardine			
		Kinghorn			
		Kingskittlo, Fife			
		Kinross			
		Kirkaldy			
320	5	Kirkcudbright	5 0 0	5 0 0	5 0 0
1000	3	Kirkintulloch, near Glasgow	3 0 0	5 0 0	3 0 0
227	5	Kirkwall	5 0 0	5 0 0	4 10 0
518	5	Kirriemuir	5 0 0	6 0 0	
		Lanark			
		Largo, near Leven			
		Largs			
		Lasswade, n. Edin.			
		Lauder			
		Leith			
		Leslie, Fife			
		Lesmahago			
		Leven			
		Linlithgow			
		Linton, n. Nobleh.			
		Lochee, n. Dundee			
		Lochgilphead			
		Lochwinnock, near Paisley			
1200	1	Markinch	1 0 0	7 10 0	1 5 0
		Mauchline			
		Maxwell-town, n. Dumfries			
		Maybole, Ayrshire			
		Maryhill, near Glasgow			
		Melrose			
718	2	Mid & East Calder	2 0 0		2 0 0
192	5	Moffat	5 0 0		
	13½	Montrose	13 10 0	7 11 1	
		Musselburgh			
		Nairn			
		Neilston, n. Glasg.			
		Newmills, near Kilmarnock			
		Newburgh, Fife			
		Newton Stewart			
		North Berwick, n. Haddington			
		North Queensferry			
		Oban			
		Peebles			
800	25	Perth	25 0 0	4 16 0	22 10 0
		Peterhead			
		Pittenweem			
		Pollokshaws, near Glasgow			
		Port Glasgow			
		Portobello, near Edinburgh			
		Prestonpans			
		Rutherglen, near Glasgow			
		Renfrew, n. Paisley			
		Saltcoats			
		Sanquhar			
		Selkirk			
		South Queensferry			
		St. Andrew's			
		Stewarton			
		Stirling			
		Stoneheavn			
		Stonhouse, Lanrks.			
		Stornoway			
		Stranraer			
		Strathaven, near Hamilton			
		Thurso			
		Tillicoultry, n. Allon			
800	1	Tranent	1 0 0		1 0 0
		Troon			
		Wick			
		Wigton			
		Wemyss	4 10 0		
		IRELAND.			
300	10	Armagh	10 0 0	8 0 0	14 10 0
		Ballinasloe			
700	50	*Belfast*	50 0 0		
		Ballymena			
		Ballymoney			
		Carrick-on-Suir			
		Carrickfergus			
		Carlow, new			
		Cork (see Un. Gen.)			
		Clonmel Consumrs			
		Drogheda			
19,000	10	*Dublin Consumers*	5 0 0	7 0 0	6 0 0
		Dublin Hibernian (see United Gen.)			
160	25	Dundalk	25 0 0		22 0 0
		Dungannon			
1000	5	*Downpatrick*	5 0 0		
		Enniskillen			
		Galway			
400	10	Kilkenny	10 0 0	8 0 0	11 5 0
		Larne			
		Limerick (see U.G.)			
1725	5	Limerick Consum.	5 0 0	5 0 0	5 0 0
600	15	Londonderry	15 0 0	6 13 4	21 10 0
500	7	Lisburn	7 0 0	6 5 0	7 0 0
520	10	Lurgan	6 0 0	6 0 0	6 0 0
		Mallow			
		Monaghan			
		Nenagh			
448	5	Newtownards	5 0 0	4 0 0	5 0 0
		New Ross			
		Newry			
		Omagh			
125	20	Portadown	20 0 0	6 0 0	20 0 0
600	10	Sligo	10 0 0		
		Tipperary			
		Tralee			
		Waterford			
		Wexford			

The Gas Works in the undermentioned towns belong to private individuals:—

Abergavenny.	Ely.	Holt.	Oswestry.	Sheerness.	Ware. (2 works)
Bridgenorth.	Farsley.	Huntingdon.	Peterborough.	Sidmouth.	Wem.
Carlow, old.	Gainsborough.	Hyde (Cheshire)	Pontypool.	Sittingbourne.	Weymouth.
Carnarvon.	Goole.	Kingston-on-Thames.	St. Alban's.	Spalding.	Whitchurch (Salop).
Deal.	Harleston	Lynn.	Sandwich.	Waltham Abbey.	Wisbeach.
Diss.	Hertford.	Morpeth.			

The Gas Works belong to the Corporations, or to Commissioners acting under special acts of Parliament, in the following towns:—

Carlisle.	Keighly.	Milton (Kent).	Richmond (Yorkshire).	Southport (Lanc.)	Walsall.
Cashel.	Knaresborough.	Paisley.	Ruthin.	Stockport	Wells (Norfolk).
Coleraine.	Lytham (Lanc.)	Rochdale.	Salford.	Strabane.	Youghall.
Greenock.	Manchester.	Rothesay.			

Price Current.

The following List of Prices is corrected by an eminent wholesale house in each trade up to the latest period.—

CASTINGS, per Ton.

Average Weight of Cast Iron Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow	Newcastle.	Wales.	Yorksh., Derbysh., and Staffrdsh
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	3 7 6	2 10 0	3 0 0	3 15 0	3 10 0
1¼ and 2 inches Socket Pipes	6 0 0	5 0 0	5 10 0	5 15 0	5 15 0
2½ and 3 do. do.	5 17 6	4 17 6	5 7 6	5 12 6	5 12 6
4 and 5 do. do.	5 15 0	4 15 0	5 5 0	5 10 0	5 10 0
6 inches and upwards do.	5 12 6	4 15 0	5 2 6	5 7 6	5 7 6
Extra for bends, branches, and connection	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0
Retorts, 1st fusion	5 5 0	..	..	4 17 6	5 0 0
Do. 2nd fusion	5 15 0	4 10 0	4 17 6	5 5 0	5 5 0
Tank Plates, ¼ thick and above	5 10 0	4 17 6	5 0 0	5 7 6	5 17 6
Do. less than ¼	5 15 0	5 0 0	5 0 0	..	5 10 0
Plain Castings ex. models	5 15 0	5 0 0	5 0 0	5 10 0	5 10 0

COALS.

NEWCASTLE. Unscreened.	s.	d.	
Tyne Main	5	6	per ton.
Ravensworth Pelaw	5	9	,,
Dean's Primrose			
Pelton			
Brancepeth	6	0	,,
Medomsley			
New Tanfield			
Pelaw	6	3	,,
Eighton Moor			
Felling Main			
New Pelton			
Peareth	6	6	,,
South Pelaw			
Waldridge			
South Peareth			
Ramsay's Cannel	12	0	,,
Cowen's Cannel	12	0	,,

DERBYSHIRE. Unscreened.	s.	d.	
Clay Cross	6	6	per ton.
Deep Main			
New Birchwood			
SCOTCH CANNEL.			
Kirkness.....best	23	0	,,
Capeldrae, first quality	20	0	,,
Ditto, second quality	10	0	,,
Lothian	18	0	,,
Lesmahago at Glasgow	16	6	,,
Ditto at Leith	18	0	,,
Wemyss	15	0	,,
Dombristle	12	0	,,
Lethans			
Bridgeness	11	0	,,
Kinnell			
Lochgelly	10	0	,,
Lumphinan			

FIRE GOODS.

Best Fire Bricks, 50s. per thousand, at Newcastle.
Do. Clay, 12s. per ton do.

WROUGHT IRON TUBING, subject to 40 per cent. Discount.

	2 inches.	1½ inch.	1¼ inch.	1 inch.	¾ inch.	½ inch.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent welded tubes, from 4 to 12 feet, per foot	1 8	1 0	0 10	0 7	0 5	0 4½
Ditto ,, 2 to 4 feet	One	penny	per foot	extra.		
Ditto ,, 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting pieces, or long screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, springs, and elbows, wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing sockets, caps, plugs, and nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain sockets	1 0	0 8	0 7	0 5	0 4	0 3
Flanches	1 9	1 6	1 3	1 0	0 9	
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 0	

FREIGHTS, per Ton.

Coastwise—Newcastle.	s.	d.
Chatham & Roches.	6	6
Cork	8	6
Dover	6	6
Dublin	9	6
Exeter Quay	9	0
Folkestone	7	0
Hastings	7	6
Ipswich	6	0
Jersey	9	0
London	6	3
Lowestoft	5	0
Lynn	6	6
Margate	6	6
Portsmouth	7	6
Plymouth	8	0
Southampton	8	3
Weymouth	8	3
Yarmouth	5	0
Foreign.		
Amsterdam	9	6
Boulogne	7	6
Barcelona	19	6
Bordeaux	11	6
Calais	7	6
Dieppe	8	6
Hamburg	9	6
Havre	9	0
Lisbon	12	0
Rotterdam	9	0
Rouen		
St. Petersburgh		
Stettin	10	0
Trieste and Venice	23	0

PORTADOWN GAS COMPANY.—The fourth annual meeting of this company took place on the 6th ult., and, from the report read, it appeared that the total

Gross rental of the company for the year 1850 was ...	£398	2	4
And the expenses of carrying on the establishment, including salaries	234	7	3
Leaving a net profit of	163	15	1
From which a dividend of 6 per cent. on the capital was declared, amounting to	142	16	0
And the balance was ordered to be carried to the reserve fund	20	19	1

It was also determined to limit the dividend to 6 per cent., and to reduce the price of gas when the profits exceeded this rate, with a suitable reserve for the wear and tear of the works and mains.

Advertisements.

C. RICKETS,

MANUFACTURER of APPARATUS for advantageously applying GAS HEATS to CHEMICAL, CULINARY, MANUFACTURING, and various DOMESTIC PURPOSES, No. 5, AGAR-STREET, STRAND (opposite Charing-cross Hospital), London.

M. SHEEN, Gas and Railway

Lantern Maker, 90½, Holborn-hill, begs to inform Managers of Gas Works, &c., that she continues to contract and supply Lanterns on reasonable terms, and keep them in repair by the year.

ESTABLISHED IN 1834.

S. KING, Gas Meter Manufacturer,

21, Cock-lane, West Smithfield, London.

Meters made of the best materials and workmanship, with all the recent improvements, and warranted correct in registration.

METER INDICES.

J. CLUER, Gas Meter, Index Maker,

and Model Machinist, No. 1, Bowling-green-lane, Clerkenwell, London.

INDICES and all other Apparatus for Gas Meters of every size and kind, made on the shortest notice, of the best metal, and of superior workmanship.

HARPERS AND MOORE,

DELPH FIRE CLAY WORKS, STOURBRIDGE.

London Depot, No. 7, WENLOCK-ROAD, CITY-ROAD,

where they have always on hand a large stock of their best Stourbridge Fire Bricks, Lumps, Quarries, Burrs, Gas Retorts, Crucibles, &c. &c.

Fire goods of every description made to order.

M. KELLY, Cast Iron Wharf, 31,

Bankside, London.—Retorts of superior quality, Socket and Flange Pipes, Bends, Branches, Syphons, and every description of Castings for Gas and Water Works, Gasometers, Tanks, Purifiers, Condensers, &c., erected complete, or the materials supplied.

Gas Valves and Sluice Cocks on an improved principle. Patent Gas Tubing and Connections.

A stock of the above articles kept.

The Pipes and Retorts supplied by M. K. are cast vertically, which ensures soundness and equality of thickness throughout.

TO Gas Engineers, Fitters, and Others.

—The MINERALIZED RUBBER TUBE COCK having been found to answer well for Gas purposes, GEORGE JENNINGS (the Patentee) begs to say it is the only Cock in the world that presents a straight and uninterrupted passage for Gas or Water, without the slightest connection with the interior passage.

The Cock when open becomes a Pipe, and the Gas is impeded or stopped by pressing a round ball on the exterior of the Tube.

Under 2 inches, prices the same as for ordinary cocks; above 2 inches and up to 12 inches, 15s. per inch. The Licensed Manufacturers are Messrs. Warner and Sons, Jewin-street, London; Mr. C. Botten, Crawford-passage, Clerkenwell; and George Jennings, Patentee and Manufacturer, 29, Great Charlotte-street, Blackfriars-road, London.

PATENT FIRE-CLAY RETORTS.

ORLANDO BROTHERS and RAILTON,

Manufacturers of O. Brothers's Patent, beg to state that these RETORTS being made in ONE ENTIRE OPERATION, and in ONE PIECE of any required shape, length, breadth, and height, are not liable to Cracks and Fissures, of which there is a just and general complaint; and they are consequently superior to and cheaper than any hitherto manufactured.

Prices per foot in length:—

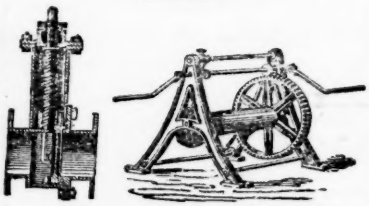
	At Blackburn.	In London.
12 in. by 12	7s. 0d.	8s. 3d.
14 in. by 12	8s. 0d.	9s. 6d.
16 in. by 12	8s. 6d.	10s. 3d.
18 in. by 15	9s. 6d.	11s. 6d.
19 in. by 13	9s. 6d.	11s. 6d.
24 in. by 15	11s. 6d.	13s. 9d.

exclusive of the angle-iron flanges.

References and further particulars may be obtained on application to the Patentee, Gas Works, Blackburn; or to Messrs. George Barlow and Son, 9, Charterhouse-square, London.

GAS, Gas, Gas.—Guise's New Catoptric

CONED SHADOWLESS GASBURNER is superior to everything for producing a pure and brilliant light by using the straight or ordinary gas glass; and Guise's Economic Shadowless Burners and Catoptric Reflectors are now well known to be the best gas-burners and glass reflectors that can be. They may be had of all respectable Gasfitters; and at his Gasburner Manufactory, No. 45, Clerkenwell-green, London. But none are genuine unless marked "Guise Registered or Patent."



IMPROVED Sluice Cocks for Water,

Gas, or Steam, brass-faced, and Sluices raised by square-thread engine-turned Screw working in Brass Nut, in every respects as good as can be manufactured, are offered at the following prices per inch:—

2-inch,	3 and 4-inch,	5 to 9 inch,	10 to 15-inch,
15s.	14s.	13s.	12s.

Lithographs of the improved self-lubricating, and various other constructions, with descriptions and prices attached, may be had on application.

Single-purchase Builders' Crabs, as above, fitted with Two Handles, and Wrought-iron Braces and Spindles, with Sett to throw in and out of gear, price 60s. each. Delivered in London free.

BARRETT, EXALL, and ANDREWES,
Katesgrove Iron Works, Reading.

Samples may be seen at Messrs. Deane, Dray, and Deane, Swan-lane, London-bridge.

JOSEPH BOULTON, Gas Meter

Manufacturer, No. 1, COPPICE-ROW, CLERKENWELL, LONDON, begs to call the attention of Gas Companies and the public in general to his improved GAS METER, containing all the latest improvements.

J. B. warrants all Meters to be manufactured of the best materials and workmanship, the wheels, &c., being of metal. Old Meters repaired on the lowest terms.

WEST BROTHERS and CO.,

in tendering thanks to the numerous Gas Engineers and Companies who have so liberally favoured them with their support for a long series of years, beg to intimate that the Business will in future be carried on by West and Gregson, who will continue to make the same first-rate articles for which the establishment has been so long noted, and who respectfully solicit the continuance of that support.

WEST and GREGSON,

GAS METER MANUFACTURERS, BRASSFOUNDERS, &c., UNION-STREET, OLDHAM.

Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.

H. JONES, Gas Meter Manufacturer,

No. 41, OLD-STREET, St. Luke's, London, begs respectfully to call the attention of Gas Companies to his latest improvements in the WET METER, by means of which water cannot be abstracted, neither can Gas by any possibility pass through the Meter without registering.

TO Capitalists and Others.—Wanted

a PARTNER, who can command the sum of £500, to aid the advertiser (who has made considerable improvements in gas apparatus, and in the manufacture of gas) in registering or patenting his invention. Two parties, each contributing £250, would not be objected to. Address to R. J., Post-office, Wimborne, Dorsetshire.

ECONOMY IN GAS.

20, King William-street, Charing-cross, London.

E. E. PERKINS offers his thanks to

the many parties who have already applied for the "WORD OR TWO ON THE GAS-LIGHT MONITOR," price 3d., and he solicits the attention of all other persons concerned in the manufacturing, distributing, and consuming of gas, to the many practical advantages receivable from the use of the Patent Gas Monitor, either as applied for illumination or heating.

THE New Patent

GASLIGHT MONITOR, adapted to every description of Burner, and supplied at a cost placing it within the reach of every consumer of Gas, regulates the flame to any required height, economizing the consumption, and preventing the danger and inconvenience arising from the flaring and smoking of lights. 20, King William-street, Charing-cross, London.

GAS ENGINEERS, FITTERS, AND

FURNISHING IRONMONGERS, are respectfully informed that the PATENT HORIZONTAL GAS STOVE is now ready for Inspection and Sale; as also is the Patent for DISTILLING BY GAS, at the Offices of the Patents for Lighting and Heating Churches and all other large Buildings by one Operation; for Cooking; for the Ventilation of Prisons, Sewers, &c.; for Chemical Manufacturing Purposes generally where a Graduated Heat is required; and for the Distillation of Spirits by Gas in particular. See same in operation, by special authority of H. M. Board of Inland Revenue, at No. 20, King William-street, Charing-cross, London.

A full Treatise on the Gaslight Monitor is now ready, giving that useful instrument fair play. That part of the Patents which combines Heating and Lighting, and also one for Cooking by Gas, is now ready.

F. & C. OSLER,

44, OXFORD-STREET, LONDON;
MANUFACTORY—BROAD-STREET, BIRMINGHAM,

Manufacturers of Glass Chandeliers, Glass Lustres, Table Glass, &c. &c.

ELEGANT CRYSTAL GLASS CHANDELIERS, FOR GAS

(Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. From £4. 15s., upwards. The more extensive use of Gas in private dwellings has induced Messrs. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.

THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE, ON THE LOWEST TERMS.

THE GUTTA PERCHA COMPANY, PATENTEES, 18, WHARF ROAD, CITY ROAD, LONDON.

GUTTA PERCHA TUBING.

GUTTA Percha Tubing, being unaffected by moisture, acids, alkalies, grease, &c., is useful for the conveyance of Water, Oil, Chemicals, Liquid Manure, &c. It is peculiarly valuable for Drain and Soil Pipes. In case of any stoppage, an incision can be made in the tubing with a sharp knife, and readily closed again by means of a warm iron. Its strength is extraordinary; the small half-inch diameter tubing having resisted a pressure of 250lb. on the square inch without bursting.

Gutta Percha is totally impervious to wet, and may be steeped in water or buried in damp or marshy grounds for years. IT IS NOT SO LIABLE TO INCRUSTATION, and, from its peculiar property as a non-conductor, is not affected so soon by the frost of winter as metal piping.

The smaller sizes of the Tubing may be had in lengths of from 100 to 400 feet, and the larger sizes of 50 feet each.

The extraordinary power possessed by Gutta Percha Tubing as a CONDUCTOR OF SOUND renders it invaluable for conveying messages from one room or building to another.

Every variety of Gutta Percha Articles manufactured at the Company's Works, Wharf-road, City-road, London; and sold by their Wholesale Dealers in town or country.